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ARITHMETIC

FOSTER E. GROSSNICKLE, *Guest Editor*

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EDUCATION
JANUARY 1959

Exploratory Materials for Teaching Arithmetic

FOSTER E. GROSSNICKLE
Jersey City State College, Jersey City, N. J.

THE three kinds of instructional materials in a modern program in arithmetic may be classified as *exploratory, visual,* and *symbolic.* This paper is concerned primarily with exploratory materials and their uses.

Exploratory materials sometimes are known as manipulative materials. Objects which may be moved, touched, or manipulated may be classified either as exploratory or manipulative materials. The way in which these objects are used differentiates exploratory materials from manipulative materials. A device, such as an abacus, is exploratory when the pupil uses it to help him in discovering the meaning of place value which is the distinguishing feature of our number system.

A pupil may demonstrate with an abacus to indicate that 10 beads on the rod on the right have a value of one bead on the next rod to the left. This same relationship exists between consecutive places in the number system. The abacus may help the pupil understand this relationship. Under such conditions the abacus represents an exploratory material. On the other hand, if the pupil merely develops skill in representing numbers on an abacus without understanding place value, the abacus is merely a manipulative material. The abacus becomes a gadget instead of an effective instructional aid.

Exploratory materials may be divided into two groups. The first group consists of materials having social significance, such as instruments for measuring distance, liquids, volume, and weight. The other group of exploratory materials consists of materials designed to teach the mathematical phrase of arithmetic. These materials include such things as disks, fractional cut-outs, a flannel board, a place value chart, and an abacus.

Visual and symbolic materials are so named because they are descriptive of the kinds of materials classified in these two categories. Visual materials consist of films, filmstrips, pictures, posters, and charts. Symbolic materials consist of textbooks, workbooks, and tests. Traditionally, most arithmetic classrooms have been equipped with symbolic materials. There must be other types of materials in the arithmetic classroom in order for the pupil to understand the work involving symbollic materials.

Learning is a growth process. A pupil who uses objects, such as disks, in solving a problem operates at a different level of abstraction than a pupil who solves the problem with symbols. Let

us consider the following problem: How many 3-cent stamps can be purchased with 20 cents? A pupil in the second grade can solve this problem providing he has 20 cents or 20 disks so that he can form groups of 3 cents or 3 disks to represent a stamp. By counting the number of groups formed, he can find the number of stamps that may be purchased and the number of cents remaining. He may solve the problem by making 20 marks and crossing off 3 marks at a time. The teacher shows poor judgment in asking the same pupil to solve this problem in symbolic form, as shown.

$$3\overline{)20}\quad 6\text{r}2$$

There is a great difference in the level of abstraction involved in the two solutions. Usually the pupil should begin the study of a new topic or process at an immature level of operation and progress through successively higher levels until he is able to deal intelligently with symbols. Therefore, there is a need and a place for exploratory materials in teaching arithmetic. These materials are to be used to enable a pupil to solve and understand quantitative situations which he could not solve or understand by using symbolic materials.

Criterion For Using Exploratory Materials

It is not difficult to provide exploratory materials for the arithmetic classroom. Merely providing the classroom with materials does not assure an effective program for learning arithmetic. It is the use made of these materials which determines the effectiveness of the instructional program. A manipulative material which does not enable a pupil to clarify or enrich his understanding of a number concept or a quantitative situation is a gadget and not an instructional aid.

Within the past decade many new devices have been manufactured for equipping the arithmetic classroom. Some commercial hucksters peddling their wares often have succeeded in encouraging teachers to purchase materials that cannot be used effectively to enrich the pupil's understanding of number. These materials or devices are gadgets which the pupil may enjoy manipulating. The benefits derived from an activity of this kind do not enrich the pupil's background so as to enable him to proceed to a higher level of abstraction in dealing with number.

The following criteria should control the use of exploratory materials:

1. *Use exploratory materials to introduce and/or enrich the meaning of a concept or process*

2. *Use exploratory materials to clarify a quantitative situation which the pupil does not understand when expresed in symbolic form*

3. *Discontinue the use of exploratory materials as soon as the pupil is able to operate with understanding at a higher level of abstraction.*

The applications of the first and second principles should enable the teacher to make a wise selection of materials for teaching arithmetic. If a device does not enable a pupil to enrich his understanding of a mathematical concept or principle, or enable him to discover relationships in problems, this material should not be part of the arithmetic equipment of the classroom.

Teachers who use exploratory materials often violate the third principle. It is very important for the pupil to operate intelligently with symbols. As long as he deals with objects, he is not challenged to operate with symbols. One of the difficult tasks confronting the

teacher of arithmetic is to decide when to have the pupil discontinue the use of exploratory materials and operate at a higher level of abstraction.

Good teaching is in evidence when the pupil is challenged to operate at the highest level of abstraction at which he can succeed and understand the work. Conversely, poor teaching is in evidence when a pupil operates at either a higher or a lower level of abstraction than he can understand the work. A teacher who has a pupil using blocks to find a number combination when the pupil should be using symbols exhibits poor teaching. Similarly, the teacher who has a pupil learn meaningless number combinations in symbolic form when the pupil should be using exploratory materials to discover the meaning of a grouping process demonstrates poor teaching. Artistry in teaching consists in discovering at what level of abstraction the pupil should be operating in order to understand the work.

There is no fixed time or pattern to follow to know when a pupil should work with either exploratory or symbolic materials. A pupil may use blocks or disks to make a number grouping, such as 4 and 6, and discover all of the other groupings having a sum of 10. This pupil may be able to derive other number facts in symbolic form from the grouping of 4 and 6. He should not make further use of blocks to find combinations. On the other hand, a pupil may need to objectify a grouping in order to understand the work. This pupil needs exploratory materials and should use them. The teacher must ask searching questions to test the pupil's understanding of the process. If the pupil shows by his answers that he has understanding of the process, then he should be encouraged to work with symbols and not with exploratory materials. Then further use of these materials changes them from exploratory to manipulative devices. If the pupil's responses show that he cannot discover a basic fact from other known facts, he needs to use exploratory materials to enable him to find the answers to these facts.

The writer observed a demonstration in the third grade in which the teacher had each pupil use exploratory materials to introduce carrying in addition. The pupils used their materials to find the answer to the example given on the right. Then the teacher gave another similar example in addition for the pupils to solve. One of the pupils responded as follows: "Must we use our squares? I can find the answer without using squares." The other members of the class did not understand the process, so they used their materials. The teacher wisely suggested to the pupil who understood the work to find the sum with symbols.

$$\begin{array}{r} 16 \\ +28 \\ \hline \end{array}$$

A Kit For Teaching Arithmetic

The classroom should be equipped with inexpensive materials which the pupil should use in learning by discovery. The materials for this purpose may be designated as *kit material* for teaching arithmetic. Both the teacher and the pupil should have a kit of materials. The two sets of materials should parallel each other in structure as much as possible.

Many classrooms in arithmetic have materials which the teacher uses for class demonstration purposes. As an illustration, the teacher may have a flannel board and demonstrate with fractional cut-outs how to add the fractions ½ and¼. There may be no discovery

on the part of the pupil in this demonstration. He may memorize the sequence of steps in the solution and then solve similar examples.

A better plan than the procedure described consists in providing each pupil with fractional cut-outs. The pupil would use these cut-outs to find the sum of the fractions. Then the teacher should have a class demonstration to clarify the procedure. The pupil first discovers a method of solving the example. Then the class with teacher guidance gives the most concise method to use to solve the example.

The materials in a kit should be kept at a minimum. A different kit should be provided for the primary grades, the intermediate grades, and the upper grades. Let us consider a kit for the intermediate grades. The essential exploratory materials in the teacher's kit for these grades consist of a *flannel board* with fractional cut-outs and a *place value chart*. An abacus is highly desirable but not absolutely essential.

A flannel board consists of a rigid surface, such as masonite, approximately 20″ x 26″, covered with flannel having a good nap. The fractional cut-outs consist of circular cardboard disks approximately 10 inches in diameter lined with flannel. The disks should represent wholes and should be divided to represent halves, thirds, fourths, sixths, and perhaps eighths.

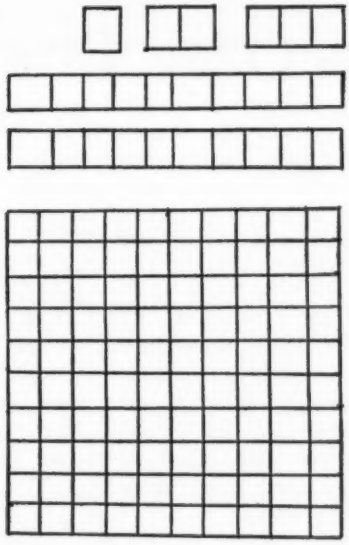
A place value chart can be made from oaktag so as to provide three rows of pockets in which markers may be inserted to represent the digits of a number. These markers may be made of oaktag or splints. The teacher may use crayon boxes, properly labeled to represent places in the number system. Thus, markers in boxes labeled TENS and ONES may be used to represent any two-place number.

The pupil's kit for the intermediate grades should consist of *fractional cut-outs, rectangular strips of geometric designs,* and *squares and rectangular strips*. The fractional cut-outs may be cut from oaktag. They should be approximately 5 inches in diameter.

The rectangular strips consist of pieces of construction paper about 1½ inches wide which contain circles or some other geometric design. The pupil uses these strips in discovering the multiplication and division facts. To find the answer to the grouping 4 x 6, the pupil could use four strips of 6 circles each. Similarly, he could use these strips to find the answer to the grouping $4\overline{)24}$.

The pupil uses the squares and rectangular strips to discover the procedures in the four basic processes in dealing with whole numbers and decimals. A piece of construction paper 12″ x 21″ divided into ¾-inch squares will provide 448 squares. This sheet of squares can be cut so as to make 2 squares of 100 ¾-inch squares each, 20 strips of 10 squares, and 48 squares. The latter can be cut so as to provide 10 single squares, and the remaining 38 squares cut into strips containing 2, 3, and 4 squares each. The pupil uses the ruled side to represent whole numbers and the unruled side to represent decimals.

The diagram shows how to represent 126. To divide this number into two equal parts, the pupil exchanges the large square for its equivalent, or 10 strips, making a total of 12 strips of 10's and 6 ones. Then he is able to divide the number into two equal parts.



The unruled squares and strip may be used to represent decimals. A large square may represent a whole; a long strip may represent a tenth; and a small square may represent a hundredth. The pupil uses these materials at his seat to discover a procedure before the teacher gives a demonstration with markers in a place value pocket to show the conventional procedure to use in dealing with either whole numbers or decimals.

The materials described for both the teacher's kit and the pupil's kit are inexpensive and easily made. Commercial materials may be substituted for these home-made materials. In a similar way, kits should be provided for the pupils in the primary and in the upper grades.

It is essential for the teacher to understand that exploratory materials are to be used to help the pupil understand a new process or procedure at a low level of abstraction. The use of these materials should help the pupil in building a background to enable him to read the verbal explanation of development of a process in his textbook. As soon as the pupil is able to understand a verbal presentation of a process, he should no longer use exploratory materials in dealing with that process. The exploratory materials are part of the program for building readiness so that a pupil is able to read his textbook intelligently. It is only as exploratory materials are used to build concepts and understandings at a low level of abstraction so that a pupil is able to operate with confidence at a higher level of abstraction that these materials constitute an essential part of a modern program for teaching arithmetic.

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Some First Graders Count Down

GEORGE E. HOLLISTER
Professor of Elementary Education
University of Wyoming

A little boy approaching six and a half and not yet in school has a father who is interested in rockets and space travel. Naturally, the little boy shares this interest which has been stimulated further by television. As the Fourth of July approached, an agreement was reached between the father and son to buy a fifteen-inch plastic rocket rather than the usual firecrackers. The rocket generates its power through a mixture of soda ash and acid. It lifts itself around forty feet in the air before coming down on its rubber nose.

This little fellow surprised the neighborhood by his grasp of the "countdown" technique of rocket launching. One minute was allowed between the time the soda and acid were combined and the "zero" tripping of the lever that sent the rocket into flight. The boy, with pull string in hand, waited as his father clocked the passing of the seconds—fifty, forty, thirty, twenty, ten. At that point the little pre-school youngster took over; ten, nine, eight, seven, six, five, four, three, two, one, zero—whish—he pulled the string and the little red rocket soared into flight to the jumping delight of all the neighborhood fans.

This actual incident raises a question for all teachers and parents. How much knowledge of numbers do first graders bring to school? In many instances it is probably more than we suspect. The people in the child's environment are the key factor. Some homes have helped the child to be conscious of number relationships. They have made a practice of utilizing number situations in family living. It would be helpful in number development if parents would encourage their children to use numbers as in the following examples. We need three more chairs for the table. How many pennies and nickles did we get back? How much money do we have? Do we have enough to buy four ice cream cones? Can we have the five or ten cent size? You may each have two cookies.

Sometimes there is, however, the opposite type of home environment. One teacher reported that children coming to her in an Indian boarding school have had practically no number experiences. She feels that a year's time is needed to build a number readiness background.

One thing seems certain—the kindergarten and first grade teacher can begin an effective number program if they have some notion of the extent and variation of the pupil's background and knowledge of numbers. How to ascertain this understanding as quickly and easily as possible is the problem.

The Number Readiness Inventory

The extent of the child's number abilities needs to be determined by some kind of number readiness inventory. Commercially prepared tests are available; however, they are not as effective

as an individual test. The problem is to find an uninterrupted ten to fifteen minutes to spend with each child. An enrollment of 28 means from five to seven hours of time for this inventory. However, these hours can pay dividends in an effective teaching program. It is better to delay the regular classwork for a time than to move blindly ahead without first determining a proper "take-off" point. Suggestions that might prove helpful in garnering this time are having the class placed in charge of the visiting teacher, the principal, room mothers, or student teachers. Some teachers can take advantage of the time when the class is being taught by special teachers of art, music, and physical education.

If a teacher can discover the extent of number ability in five areas she should have a better idea of where to begin her program. These five areas include the pupil's ability (1) to count, (2) to recognize number quantities, (3) to select the correct number group, (4) to match number symbols, and (5) to recognize the number symbols. A small kit of materials and a form for recording the responses and the teacher is ready to begin.[1]

1. *The Ability to Count*

Most pre-school children have developed some facility in counting. They first learn some number names. A three-year-old often gets pleasure out of being asked, "Can you count?" "Sure I can," is the quick reply. The response may be something like this, "Three, four, eight, one, seven." In a short time the names begin to assume the correct order, and a certain degree of ability to count by rote has been achieved.

The second stage in counting—rational counting—is more difficult. This competency is developed when the child understands that he must make a one-to-one correspondence when counting a group of objects. The six-year-old may say counting to four, "No Betsy, we only need three spoons—you have four."

A quick way for the teachers to determine this facility is to have fifteen to twenty objects for the child to count. Ask the pupil to touch the article or pull it toward himself as he counts. If he says the number of names in the correct order but is unable to make the one-to-one correspondence his ability to count by rote can be noted. However, rational counting is the more advanced ability.

Occasionally a beginning first grader can count to one hundred by rote. The important thing to determine is whether he can bridge the tens and has a command of the names and the order to twenty, thirty, forty, etc. It is not worth the time during this indivdual inventory to have him actually count by ones to one hundred. If the extent of his ability in this regard is established, the actual performance is not important.

2. *The Ability to Recognize Number Quantities*

The more mature mind develops the ability to recognize, almost at a glance, small number groups without resorting to counting. A few entering first graders have this ability. For example, if the pupil is asked, "How many chairs are around the table?" or "How many children are feeding the fish in the aquarium?", he can visualize and respond immediately without counting. An adult can detect this in a child's mental processes by placing small objects in a

1. Further suggestions for materials to be used and a form for recording responses can be found in the following reference:
George E. Hollister and Agnes G. Gunderson, *Teaching Arithmetic in Grades I and II*, Boston: D. C. Heath and Company, 1954, Chapter 4.

group with the query, "How many blocks in all?" Note whether the pupil waits to count or if he gives the answer instantly. It is probably better not to use the familiar domino pattern. Groups up to five will be adequate to test the brightest pupils.

3. *The Ability to Select the Correct Number Group*

Another advanced understanding among some entering first graders is the ability to choose the correct number group from among two or three possibilities. To discover if a child can do this the teacher should arrange groups of objects in various patterns and ask the child to select a specific number. For example, clusters of two, three, and four blocks might be placed on the table and the pupil asked, "Give me three blocks." It is observed whether the child selects at once the group of three blocks. A group of five should seldom be used. If the pupil counts in any way or disturbs the arrangement of the objects in selecting the correct number of blocks, he does not have the ability described.

In preparing for this part of the test, as well as for the preceding section, it is best to have a sheet of paper with light pencil marks to show where the objects should be placed. This aids in making the various arrangements quickly and keeps them uniform for all children. Without this uniformity a comparison of results for all the pupils would not be valid.

4. *The Ability to Match Number Symbols*

Even though the child may have had a rich number experience it is possible that his recognition of the number symbols is not well developed. After all, there is little about our symbols to give a clue to "how many." The first ten Roman numerals are much more helpful in this regard. This is probably one of the first arithmetic algorisms faced by the pupils.

To check on this ability a card nine inches square is marked off in three inch squares. In each of these squares a number from one to nine is drawn. The numbers should be written out of sequence so that the child cannot rely on rote-counting to assist in his performance. A corresponding set of numbers of the same size are written on individual three-inch squares. These individual squares are given to the pupil, and he is asked to place the numbers over the like number on the large card. Errors are recorded on the individual record card for subsequent attention.

5. *The Ability to Recognize Number Symbols*

Most children can match number symbols before they can recognize them on a pure recall basis. This can be checked quickly by using the same materials used in the preceding section. The individual numbers are placed over the corresponding number square on the card and the pupil is asked, "Give me the number four," etc. If the child selects all the numbers quickly and correctly, he has demonstrated his ability to recognize the symbols. If he makes some incorrect selections such as confusing the 7 and the 9, a note should be made for future individual teaching.

In conclusion, it can be assumed that many kindergarten and first grade teachers discover in an informal way the number capabilities of their pupils. While information thus gathered is helpful, it is the thesis of this paper that a more systematic approach to the

problem will pay rewards in promoting richer number experiences for children. Even if time could be found for only the tests described under points one, two, and four above, the information gained would be fruitful. A summary of the number abilities of each child in the class that is readily accessible to the teacher should help in formulating a rich number experience program.

A Breadman's Horse

A breadman's horse stands solemnly
Through rain and winter's cutting sleet
He patiently awaits his master
Through winter's fog, and summer's heat.

His master brings the cruel whip down
Without a word, without a sound
This sad and lonely horse obeys
If he could speak I wonder
What the breadman's horse would say.

by Suzanne R. Bryrant, Age 10
Toronto, Canada

Structuring the Basic Facts

GLADYS RISDEN
Vermilion, Ohio

TEN-YEAR-OLD Dick, I.Q. 110, was looking at the checkers, arranged in groups on my desk, as shown below.

00 00 00 00 0
00 00 00 00 00

"Beepers! I can *see* . . . three fours are twelve; three and four are seven!"

3 × 4. 3 + 4. He knew one was 7 and t'other was 12, he went on to explain, but which was which? He never could remember.

"I'm real proud of myself," exclaimed fifteen-year-old Joan, restaurant-keeper's daughter (I.Q. 105). "I looked at the pies today and *saw* twenty-four pieces—four sixes, twelve and twelve. Always before I had to count."

Of course she had known that "four times six are twenty-four," she went on to explain, but she didn't know that those four pies on the shelf, each cut into six pieces, were "four times six." That is, she amended, she had known that "four times six" were "twenty-four" when she stopped to say her times tables, but when she answered quickly she would almost always say "ten." She didn't know why; the answer "ten" just "popped" into her head.

All Started at the Beginning

In recent years I have been tutoring pupils who are experiencing great difficulty in arithmetic. The I.Q. of these pupils ranged from 90 to 145 with a median of 112. The ages of the pupils ranged from 7 to 15 years. Regardless of age or I.Q., all these pupils needed to start learning arithmetic by seeing *twos* and *threes*. The pupils make flash-identifications of the groups of objects I toss on the desk between us: "two threes," "a two and a three," "two threes and another three." . . . I watch their eyes. When I see one making his identification with a single focus of his eyes I know he is ready to start relearning the facts of groups to tens—first unlearning that "five and three" is the "third number after five," or "one more and one more and one more—six, seven, eight."

Most of the children count, "five, six, seven." When a pupil stops giving "7" as the answer for "five and three," I am pretty well satisfied that he is beginning to free himself from the shackles of an arithmetic that is "ones."

Rearranging Groups

Each of my pupils begins by manipulating groups to ten, rearranging fours, fives, sixes, sevens, eights, nines, and tens in turn, recording and tabulating:

8 is 4 and 4. 8 is two fours. 8 is four twos.*

8 is 5 and 3. "I put one from this four over with this one."**

8 is 6 and 2. "I put one from this four and one from this four together."***

8 is 7 and 1. "I put one from one four over here."****

00 00	00 00	*	000 00	0 00	**

00 0	00*** 0		00 00	00 0	0	****
00					

8 is two threes and two.***
8 is 1 five and 1 three.**
8 is 1 more than 7. 8 is 1 less than 9.
8 is 2 more than 6. 8 is 2 less than 10.
8 is 3 more than 5.
8 is 4 more than 4.
(etc.)

I test his *knowing* by flashing groups to ten in all various arrangements for instant recognition of group-size; asking a pupil to select groups from stockpiles instantly without counting, to change a group of six to a group of eight by a single instantaneous pulling out of the stockpile of the right-sized group; asking for identification of the "hidden" group (a split-second exposure of a group of nine, for example, then covering three in a swift sweep, leaving the balance of the group-of-nine exposed for an instant more).

Throughout this work with groups the pupils are encouraged to verbalize their rearrangements. They are encouraged, also, to try out alternate arrangements. A pupil, for example, may select a group-of-seven by reaching into the stockpile for two 3's, then another one, study his arrangement, push the one into one group-of-three, study, nod his satisfaction, put the entire group-of-seven back into the stock pile, pull out another group-of-seven by selecting a group-of-four with one hand and simultaneously with the other hand, a group-of-three. Then he might be struck by another idea, push the group-of-seven back into the stock pile again, pull out a group, give it a glance to identify its size (group-of-five), reach into the stock pile for a group-of-two which would change it to a group-of-seven.

When a pupil can handle all groups of ten or less with facility, he begins regrouping the teens. Consider the sum of 7 and 8. Change two from the group-of-seven to the group-of-eight . . . group of five and group of ten, fifteen. ('Fifteen' says 'five and ten.')

How much is 8 less than 15? Take group-of-eight from group-of-ten, leaving a group-of-two. Combine a group-of-two with the group-of-five, making a group-of-seven.

How much are two 9's? Take one from each of two groups-of-tens, change to a group-of-ten and a group-of-eight.

How many groups-of-eight in twenty? Take a group-of-eight from each group-of-ten, thereby rearranging the whole quantity into two groups-of-eight and two groups-of-two. 'Twenty' is 'two eights and half of another eight.'

What is a fourth of sixteen? Break the group-of-ten into two equal parts, break the group-of-six into two equal parts. Half of sixteen is a 'group-of-eight.' Break each group-of-eight into two equal parts. This makes four parts. A fourth of the group-of-sixteen is a group-of-four. Three-fourths are three groups-of-four . . . a group-of-ten and a group-of-two, or a group-of-twelve.

Dimes, toothpicks bundled in tens, cards of buttons—ten on a card, miniature automobiles—ten in a sack, the spool board—ten pegs for spools in each row (ten rows), the abacus, are substituted for ones and the children under my instruction quickly become as adept at rearranging tens, as ones: Forty and thirty, ten more than two thirties, are seventy.

How much are 50 and 80? Think, "50 and 50 and 30 are 100 + 30, or 130."

Parents in the background, listening in as their problem-learner and I group checkers and dimes and say with words what we see, begin to show signs of doubt at this stage. They brought their respective problem-learners to me to

have them taught "arithmetic," and arithmetic to each of them means "snappy answers." What they are seeing isn't reassuring.

Their children are slow; they make mistake after mistake; they frequently are confused. And the parents, themselves, are confused. I see their restiveness but I am not disturbed. I know that tomorrow, or the next day, or next week, their child will flash a split-second glance at a group-of-eight and a group-of-nine and identify "seventeen." Then he'll exclaim: "Why I didn't have to think the answer; seventeen just popped into my head!" And I know that the answer to all the other "number facts" will be popping into his head, and that they are there for *remembering*, and *using*.

Fifteen-year-old John, with an I.Q. of 140 and excellent perceptual potentiality, achieved this AHA!, or I SEE!, moment the fourth day. Fifteen-year-old Mike, with an I.Q. of 140 but with inferior perception, needed eleven days. Fifteen-year-old Joan, with an I.Q. of 90 and low-average capacity for verbal-thinking, needed six weeks.

Eight-year-old Billy, with an I.Q. of 145, excellent in capacity for verbal thinking, but with subnormal rote memory and a considerable degree of impairment in auditory integration (which had handicapped him in class work in getting meaning from the teacher's explanations and demonstrations by words and figures) shouted, "I see!" the sixth day. Eight-year-old Ned, with an I.Q. of 110 but low average in verbal thinking, needed four months.

Beyond Perceptual Experience

Not one of the children I have tutored has failed to learn the fundamental facts and processes through structuring (ordering and arranging) his own perceptual experience. One in ten, however, has failed to advance beyond perceptual experience, to structuring conceptual experience which is learning by reasoning. As I have gained in experience, I have been able to introduce the learning-by-reasoning earlier in the age-scale. Perhaps the day will come when I too will succeed in helping even the one-out-of-ten to succeed. This pupil typically is the child with an I.Q. of 90 or below in verbal intelligence though his non-verbal I.Q. may be 100 or higher. He is handicapped in the use of words and symbols to summarize experience.

We start to use words and symbols to summarize our perceptual experience as soon as a given child knows and recognizes *twos* and *threes*, and advance at each child's own rate as he learns to structure the number facts.

The day Johnny "discovers" that "6" is "4 and 2" by rearranging "3 and 3" into "4 and 2," I "do" with figures and symbols what he has done with markers.

6 is (3 and 3). 3 is (2 and 1). So 6 is [(2 and 1) and 3], and that's the same as [2 and (1 and 3)]. Therefore, 6 is (4 and 2). Also, 6 is [(1 and 2) and 3], which is the same as [1 and (2 and 3)]. Therefore, 6 is (1 and 5).

That is the way we talk it. This is the way we write it:

$6 = 3 + 3.$ $\quad 3 = 2 + 1.$

So $6 = (2 + 1) + 3.$

$(2 + 1) + 3 = 2 + (1 + 3).$

$6 = 2 + 4.$

$7 = 6 + 1.$ $\quad 6 = 3 + 3.$

So $7 = (3 + 3) + 1.$

$(3 + 3) + 1 = 3 + (3 + 1).$

$7 = 3 + 4.$

Johnny rearranges 7 by reasoning first, then verifies with groups. Pete is working with 9 before he is ready to reason first. Jody is on 10.

By the time Johnny is working on 12 he has outgrown the need for perceptual experience. He rearranges groups by reasoning:

$12 = 10 + 2 = (9 + 1) + 2.$
$(9 + 1) + 2 = 9 + (1 + 2).$
$12 = 9 + 3.$

$12 = 10 + 2 = (8 + 2) + 2.$
$(8 + 2) + 2 = 8 + (2 + 2).$
$12 = 8 + 4.$ etc.

$15 - 8 = (10 - 8) + 5.$
$(10 - 8) + 5 = 2 + 5.$
$15 - 8 = 7.$

alternate:

$8 = 5 + 3.$
So $15 - 8 = (15 - 5) - 3.$
$15 - 8 = 10 - 3.$
$15 - 8 = 7.$

Johnny can solve the example 650 — 162, "in his head" faster than he can solve it on paper. He *understands* and is freed from dependence upon pencil; but there are more difficult problems he cannot solve "in his head." So the time has come for him to master the conventional procedure which the race has invented for meeting needs beyond the range of "mental" computation.

EDITOR'S NOTE:—Miss Risden shows how to build readiness in the pupil for a more mature way of subtraction. He should now be taught the standard way to subtract, called the algorism, which the race has found to be the most efficient way to subtract. The pupil should now learn this procedure as given in a textbook and develop skill in subtraction. Then he should arrive at the stage of learning which Brownell has characterized as "meaningful habituation."

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Whither Arithmetic in Grades 7 and 8?

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Supervising Director of Mathematics
Washington, D. C., Public Schools

IT has been said that many teachers in the classroom spend their time answering questions that no one ever asks!

In order to avoid a similar error in this article, I am going to quote some of the questions that junior high school teachers sent to the Washington office of the National Council of Teachers of Mathematics and to the Specialist in Mathematics at the U. S. Office of Education in May, 1958. The questions came as a response to the request of the Secondary School Curriculum Committee (SSCC) of the National Council of Teachers of Mathematics. This committee, under the chairmanship of Frank B. Allen of Lyons Township High School, La Grange, Illinois, has embarked on an ambitious four-year program in which they plan to study and report on:

a. The place of mathematics in contemporary society
b. The aims of mathematical education
c. The pedagogy of mathematics
d. A definite curriculum in mathematics for secondary schools
e. The initiation and administration of the mathematics curriculum in the schools.

At the April, 1958 meeting of the SSCC it was decided to prepare an interim report for the guidance of those who must make decisions pertaining to the secondary school curriculum. It was agreed that in order to do this well, the committee must feel the pulse of teachers and know what questions they would like a national committee such as this one to answer. In response to an inquiry, questions poured in. For purposes of this article, I am quoting some typical questions that were asked about junior high school mathematics.

Questions Being Asked

1. What is the new philosophy which undergirds the program in junior high school mathematics?
2. What mathematics is essential for all junior high school pupils?
3. What change of emphasis should be made in junior high school mathematics curriculum?
4. If there is to be an accelerated program for the gifted, at what grade should it begin?
5. Should we group students in grades 7, 8, etc. or should we group them according to their achievement status in various subjects?
6. What courses should be offered in junior high for the gifted and average?
7. What kind of enrichment is appropriate for junior high school mathematics?
8. Should algebra be taken in the eighth grade?

9. Should present 7th and 8th grade mathematics be taught in one year?
10. Are business mathematics topics (such as interest) appropriate for 7th and 8th grades?
11. What social applications of mathematics should be eliminated in junior high mathematics?
12. What "modern" mathematics topics should be included in junior high math?

The above questions illustrate the far-from-settled status of mathematics in the junior high school and the need for more study and experimentation in these grades. There is evidence of a feeling that changes are in order but that more direction is needed.

This article will not attempt to give answers to all the questions, since that will be done by the SSCC, but it will tell what some schools and organizations are doing to answer similar questions.

Grade Level Organization

It has been said that between sixth grade artithmetic and ninth grade algebra comes a lull that is known as junior high school mathematics. Those of us who have been working hard in the 7th and 8th grades are tempted to resent this statement, but let us examine possible bases for it.

The 7th and 8th grades may be part of various school organizations such as 6-6, 7-5, 6-3-3, 8-4, or others. Sometimes the mathematics student uses textbooks written for the 7th and 8th grades of an elementary arithmetic series and sometimes he uses books explicitly for a junior high school program. In the former case the stress is likely to be somewhat more on arithmetic and less on informal geometry. In either case the arithmetic is likely to be a review (often re-teaching) of phases of the arithmetic of whole numbers, common and decimal fractions, and a thorough study of percents, which are often started in earlier grades, with varied applications to such topics as interest, discount, insurance, taxes, etc.

The Meaningful Approach

Many pupils in grades 7 and 8 get an insight into arithmetic which they never had before because of the earnest effort of teachers and textbook writers to put meaning into the arithmetic that the pupils have been studying. In fact, the keynote of today's arithmetic at all levels can be designated as "meaningful." Tremendous efforts are also being put into adjusting this 7th and 8th grade artithmetic to the wide range of achievement of pupils coming from the 6th grade.

Much experimentation has been done in connection with the learning of arithmetic, and experiments are showing the value of a modern, meaningful approach. This approach has been summarized by Brueckner, Grossnickle, and Reckzeh[1] as follows:

MODERN APPROACH

1. Learning takes place through experiences that are intrinsically genuinely PURPOSEFUL.
2. Learning should be MEANINGFUL and induce INSIGHT.
3. DISCOVERY of facts, meanings, and generalizations by the learner through inductive methods leads to understanding and insight.
4. Content should be so presented that the PERCEPTION OF RELATIONS is facilitated.

1. Brueckner, L., Grossnickle, F., and Reckzeh, J., DEVELOPING MATHEMATICAL UNDERSTANDINGS IN THE UPPER GRADES. Philadelphia. Winston Co. 1957.

5. A wide VARIETY OF LEARNING EXPERIENCES should be provided to extend meanings and to assure needed practice.
6. Learning is a GROWTH PROCESS leading gradually to responses at an increasingly mature level.

In our number system itself, there are some aspects which, when taught, help develop a deeper understanding and a good foundation for further study:

1. The numbers used in grades one to six are rational numbers, or numbers that may be expressed as the quotient of two integers, as $\frac{2}{3}$, $\frac{5}{1}$, .9, etc. Irrational numbers, such as $\sqrt{2}$, $\sqrt{5}$, which usually come up in grades 7 and 8, extend pupils' knowledge to a more comprehensive system of numbers.
2. The commutative property holds for addition and multiplication, as: $3 + 7 = 7 + 3$; $5 \times 6 = 6 \times 5$.
3. The associative property holds for addition and multiplication, as: $(3 + 4) + 6 = 3 + (4 + 6)$ and $(3 \times 4) \times 6 = 3 \times (4 \times 6)$.
4. The distributive property holds for multiplication with respect to addition, as: $5(6 + 3) = 5 \times 6 + 5 \times 3$.
5. Every number except zero has a "multiplicative inverse" which, when multiplied by the number, gives one, as: $6 \times \frac{1}{6} = 1$; $\frac{3}{4} \times \frac{4}{3} = 1$.
6. There is an "identity" element for for the operations of addition and multiplication. For addition, it is zero: $6 + 0 = 6$; $11 + 0 = 11$. For multiplication, it is one: $5 \times 1 = 5$; $7 \times 1 = 7$.

Such emphasis on meaningful teaching and on developing understanding of our number system has led to many changes in teaching in recent years. In the preparation of teachers, the structure of the number system and the meanings and laws associated with our computations have been studied. Many courses of study in arithmetic carefully spell out the necessary teaching developments. Textbooks reflect the same philosophy, and are more and more helpful in giving pupils an understanding of our number system and of the fundamental processes, as well as relating these processes to many everyday problems. Excellent learning aids have been designed to help develop understanding.

Developing such understandings in arithmetic is not as easy as some might think. For instance, after one teacher had carefully taught the differences between the Roman system of numeration and the Hindu-Arabic, with its use of the zero and of place value, he tried to evaluate the pupils' grasp of these differences by asking, "Why is it that when the Romans wrote 'III', it meant three, but when we write 'III', it means one hundred eleven?" The child who was called on pondered the question for several seconds and then replied thoughtfully, "Well, times have changed!"

Commission on Mathematics

The mathematics curriculum is constantly being studied by various groups of people. Foremost among such recent studies is that of the Commission on Mathematics of the College Entrance Examination Board. This group was set up in 1955 and has prepared a suggested revision of the mathematics work for grades 7-12 for the college preparatory students. The content for grades 7 and 8 is divided among three categories, ARITHMETIC, GEOMETRY,

and ALGEBRA STATISTICS. The recommendations for ARITHMETIC in grades 7 and 8 are as follows:[2]

"FUNDAMENTAL OPERATIONS AND NUMERATION: Mastery of the four fundamental operations with whole numbers and fractions, written in decimal notation and in the common notation used for fractions. This includes skill in the operations at adult level (i. e., adequate for ordinary life situations) and an understanding of the rationale of the computational processes. The understanding of a place system of numeration with special reference to the decimal system and the study of other bases, particularly the binary system. Ability to handle very large numbers (greater than 1,000,000) and very small numbers (less than one ten-thousandth). The nature and use of an arithmetic mean. In addition, a knowledge of square root and the ability to find the approximate values of square roots of whole numbers is desirable. (The process of division and averaging the divisor and quotient—often called Newton's method is suggested.)

RATIO: The understanding of ratio as used in comparing sizes of quantities of like kind, in proportions, and in making scale drawings. Per cent as an application of ratio. The understanding of the language of per cent (rate), percentage, and base. In particular, the ability to find any one of these three designated numbers given the other two. The ability to treat with confidence per cents less than 1 and greater than 100. Applications of per cent to business practices, interest, discount, and budgets should be given moderate treatment."

School Mathematics Study Group

A very significant national project of which we will hear much more, the School Mathematics Study Group (SMSG), was begun in 1958. It is an organization sponsored by the three professional mathematics organizations—The American Mathematical Society, The Mathematical Association of America, and The National Council of Teachers of Mathematics. Dr. E. G. Begle of Yale University was selected to be the Chairman of SMSG, and an Advisory Committee from the three organizations helps guide the activities. In the summer of 1958, a group of about forty people—mathematicians from colleges and industry and secondary school mathematics personnel selected by SMSG—met at Yale University for a month to examine the mathematics curriculum, grades 7-12, to see how it needs to be revised to meet the needs of today in the best way, and to prepare experimental or proposed courses of study for those grades, sample textbooks, and monographs for teachers on mathematical topics.

The sub-group working on 7th and 8th grade mathematics felt that for many students more actual pure mathematics could be added in those grades. Experimental units which were prepared and which will be tried out during the school year 1958-1959 include the following which were designed to undergird and enrich the study of arithmetic: decimal and non-decimal numeration, the natural numbers and zero, factoring

2. "The Mathematics of the Seventh and Eighth Grades," A program recommended by the Commission on Mathematics of the College Entrance Examination Board. 1957. Address: 425 West 117th Street, New York 27, N. Y.

and primes, divisibility, unsigned rationals, and a supplementary unit for superior students on finite mathematical systems.

Current Experimentation

What phases of mathematics are being tried in the 7th and 8th grades, and who is doing some of this interesting experimentation? I shall mention just a few.

At the University of Maryland, Dr. John R. Mayor is directing an extensive study, financed in part by the Carnegie Corporation, of the 7th and 8th grade curriculum in mathematics. Working closely with the University of Maryland project in the school year 1957-58 were teachers from four school systems in area: Prince Georges and Montgomery Counties in Maryland, Arlington County in Virginia, and Washington, D. C. A National Science Foundation Institute, with participants from seventeen states, continued the work in the summer of 1958, preparing new textbook materials, trying them out with a class of 12-year-olds, and writing up units for experimental use in the school year 1958-1959.

The mathematics course study of the West Hempstead Junior-Senior High School contains the following quotation from Mrs. Florence Elder, Chairman of the Mathematics Department: "The impact of the new 20th century mathematics has resulted in a serious lag between the traditional curriculum and modern mathematics. Teachers of mathematics need to be aware of truly modern trends and developments in the teaching of elementary and secondary mathematics. They should carefully examine these points of view and new subjects." Some of the unusual accomplishments of gifted 7th and 8th graders in this school were reported in an article by Mrs. Elder in the November, 1957 issue of THE MATHEMATICS TEACHER Magazine.

Robert Fouch of the Campus School at Florida State University at Tallahassee says that he became discouraged at the similarity in what you do to get junior high school pupils to do a problem to what you do to get an electronic computer to do a problem. He wanted to teach for understanding and for appreciation of the usefulness of mathematics, but found pupils disinterested in many of the business appplications of 7th and 8th grade arithmetic and in the reteaching of elementary school arithmetic which needed strengthening. He tried several projects in "modern" topics such as base-8 arithmetic and modular arithmetics and was pleased to find how interested pupil were in them. Says he, "It's not an either-or situation; let's combine the good features of both types of programs."

In Minneapolis, Dr. Paul Rosenbloom has done a good deal of experimenting with children in grades 5 through 8, in which they have gained certain glimpses into "modern" mathematics and learned something of the beauty and logic of the structure of mathematics.

After examining the contents of these experiments with "modern" mathematics it was interesting to see that they all included topics in the following categories which underlie traditional arithmetic:

1. Numeration.

   The idea of one-to-one correspondence was studied in each experiment. Other systems of numeration besides the decimal were studied. The binary system was of particular interest, because of its use in electronic computers. Better students studied numeration systems

with bases other than 2 and 10, learned to calculate in such systems, and discovered their advantages and disadvantages.

2. The laws of our number system.
   In order to have pupils understand better the meanings of the arithmetic they are studying, pupils are being led to discover the laws of the number system—associative, commutative, distributive. Pupils can then see how these laws explain the arithmetic processes that they have been doing by rote. For some gifted students, the work in computation in the decimal system was also made more meaningful by a study of modular arithmetics, a study of their properties, closure, identities, and inverses, and a look at the natural numbers and the whole numbers as mathematical systems.
3. Elementary number theory.
   A natural extension of pupils' knowledge of computing is a study of fascinating facts about numbers from elementary number theory. Many pupils have "cast out nines." Why does this work? When doesn't it work? In base-8 arithmetic, can we cast out sevens? Which numbers are divisible by 2, 3, 4, 5, 8, 9, etc.?
4. Deductive reasoning.
   Since mathematics is the science of deductive reasoning, it is reasonable that pupils should get this idea before studying geometry in the tenth grade where this aspect of mathematics is emphasized particularly. For simple but exciting things, each of the experiments mentioned above included some work with logic and with postulates and simple theorems.

In reply to my inquiry to Dr. M. L. Keedy, Associate Director of the project at the University of Maryland, as to why some of the particular topics in "modern" mathematics were chosen for grades 7 and 8, he replied, "We're not dragging in modern concepts for their own sake, but to make the ordinary artithmetic more understandable. Through the teaching of such topics, we're succeeding in making pupils more precise in their mathematical language, in developing in them an understanding of mathematical systems, and elementary language of *sets* which will be useful to them throughout their study of mathematics, all of which makes the junior high school arithmetic more interesting and understandable. Deduction, the heart of mathematics, belongs in these grades. Think how easy it is to prove that the sum of two odd numbers is an even number, and think how fundamental the *process* of deduction is in mathematics. It can be done informally at the junior high school level."

Adventure in Learning

In a conversation with Dr. Paul C. Rosenbloom of the University of Minnesota, who is a member of the School Mathematics Study Group, I posed the following question: "Why do you think there has been such a sudden impact of modern mathematics on the curriculum at this particular time, rather than more gradual changes in the curriculum?" His reply was substantially as follows: "Today the changes in society are accelerated to a speed never known before. Up to now professors taught teachers what they should know and what pupils should be taught. That is all very well in a society where things do not change much. But today, subjects are expanding and even the fundamentals of the subject are changing.

As our society changes more rapidly, it becomes less and less possible to predict what a pupil is going to need to know. Today teachers need to take a frank attitude of fresh exploration and joint learning with pupils. Pupils on the one hand can contribute things to this joint learning process that the teacher cannot, such as a fresh point of view and an openmindedness to new things unhampered by traditional training. Teachers on the other hand bring to the exploration a certain background and experience, an ability to organize activities for learning, a familiarity with symbolism, and an acquaintance with professors to whom they can go for help. Since 1945 the rate of change of our civilization has been so great that what one generation knows is not enough for the next generation. The general public is becoming aware of how mathematics pervades all parts of our lives. The emphasis in education is how to find out things, and the study of modern mathematics is so important because it is one of the main ways of finding out new things. Teachers are going to have to teach many things they never studied in college and to learn from students how teachable the new materials are. WE'RE ALL IN THIS ADVENTURE IN LEARNING TOGETHER."

Where To?

There is so much activity in mathematics and in modern life with its great demands for mathematics that no one can predict what the curriculum will be like ten years from now, or even five. We do know that a real understanding of the arithmetic of the elementary school, strengthened and motivated by the mathematics of grades 7 and 8, is an excellent foundation for continued study for a scientific career or for the inevitable uses of mathematics in daily life.

BOOK REVIEW

SOCIETY AND EDUCATION. By Robert J. Havighurst and Bernice L. Neugarten. Boston. Allyn and Bacon. 1957. $6.25.

The names of Havighurst and Neugarten are known far beyond the close of the University of Chicago and their reputations as sociologists and educators have been well earned. In this fine text, certain major topics and problems in the realm of education have been selected and presented in the light of sociology. The whole area of sociology and social anthropology has been drawn upon in order to help teachers to understand how the individual becomes a cooperating and functioning member of a complex and ever-changing society. The volume is in four parts. The first part is introductory and presents in general outline the structure of American society and the processes underlying social development and the formation of social loyalties in the child. Part Two considers the social environment of the child and the adolescent. The major social influences that operate on him are identified and discussed. These include the family, the peer group, and the numerous institutions of the community. The third part looks at the school as a social institution. The final section deals with the teacher as the key person in the inter-action among child, school, and community. The volume is one that can be used as a text in teacher education. It contains material that every school person must study and digest if he is to function with any degree of effectiveness and intelligence in the school picture.—W. P. S.

Solving Problems in Arithmetic

G. T. BUSWELL
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THE search for better ways to teach problem-solving has often been focused on an attempt to find some formula for teaching pupils how to think. So far, no signal success has resulted from this effort, although one outcome has been the belief that certain logical steps should be followed in sequence. The slogan that the function of education is to teach students how to think has implied that there exists a right way to solve problems and that research should discover this "way."

It is, of course, possible that there is a superior single formula for problem-solving thinking. However, there are reasons for serious doubt that there is a single method of thinking that is universally superior, and it may be that greater success would come from broadening the search by admitting the complexity of the thinking process and attempting to identify superior ways, rather than a single way, of solving problems. This article will deal briefly with what seem to be helpful ways of solving problems in arithmetic.

At heart, solving a problem is simply a process of straight-forward logical thinking, no different in arithmetic than in dealing with perplexities on the playground. Five simple suggestions will be offered which may help children to do such straight thinking. However, solving problems in arithmetic also requires the use of certain number skills, without which correct answers cannot be found. Four of these skills will be discussed briefly. In terms of what we now know, better results may be expected from dealing with problem-solving in arithmetic in some of these simple commonsense ways than in applying some formula that claims to be 'the way" to solve problems.

Thought processes

(1) Most children, by the time they enter school, have already learned to think sensibly in solving ordinary problems that are encountered day by day. The important fact to note here is that what they do seems right and logical to them. They do not try absurd ways to meet problem situations but rather they attack new problems by using the knowledge already acquired from dealing with similar situations. This is a good starting point for problem solving in arithmetic. Instead of attacking arithmetic problems as though they were unnatural situations encountered only in a school room, pupils should be induced to try to solve them with the same kind of straightforward thinking that they would use out of school. But if this is to be done, it is necessary that the problems be stated in terms that make sense and that they deal with situations within the scope of the child's experience. It is difficult for a textbook to present problems that are equally genuine for all the kinds of pupils that use a particular book. Teachers may help in such cases by explaining the settings of problems that are strange to children or even by

substituting new social settings but using the same numbers and arithmetical processes.

(2) A second way to help children solve problems is to teach them the special kind of careful reading that is needed. Reading an arithmetic problem is not like reading a story. Problems should be read with definite questions in mind, such as, what does the problem ask me to find, what specific facts are given that are needed to solve the problem, are there other irrelevant facts that are not to be used, do I know the meaning of all the words, and finally, what are the exact numbers to be used. This kind of careful reading pays good dividends.

(3) After the problem has been read carefully, the pupil must next decide which arithmetical processes are to be used and which is to be used first. Sometimes there is more than one way to start and the pupil must decide which way would be simpler. The important thing here is that the pupil think clearly about what process to use before beginning to compute. For example, a pupil might think to himself "I must first add these amounts and then divide the sum by 5 to get the answer" or in another problem "I must first multiply to find the cost of each item and then add the products to get the total bill."

(4) A further help in solving problems is to estimate what the approximate answer would be before beginning to solve. Estimating the answer provides a bench mark to guide one's thinking. If, for example, the correct answer were estimated to be about $5 and the pupil arrived at an answer of $50, he knows at once that something must be wrong, and in this case he would have a strong suspicion that the trouble was an improperly placed decimal point. While this suggestion seems simplicity itself, research studies have shown that, even at the college level, many students have only a vague understanding of how to make a sensible estimate. Making estimates is something that needs to be learned.

(5) Finally, pupils should learn to verify the answers to problems. Rather than simply repeating their computations in order to verify the answer they should use other methods to check their work. Verifying the answer is important not only as a sensible part of problem solving but in doing it pupils may gain new insights about number operations and processes.

The five suggestions in the preceding paragraphs are not arithmetical in the narrow sense but would be equally useful in solving non-arithmetical problems. They deal with techniques of thinking. Pupils should learn to think of problem solving in arithmetic as the same kind of common sense process that they use in solving problems outside of school. Teachers should be as concerned with how pupils think when they solve problems as they are about the answers that are obtained.

Number processes

Although straight logical thinking is a necessity in solving problems in arithmetic, it alone is not sufficient. One must also be competent in the number skills that are required. Lack of competence in these skills accounts for many mistakes that are made, even by bright pupils who think logically but make errors in computation. Although there are many types of errors in computation, research has shown that as many as seventy per cent of them are due to as few as ten erroneous habits. Therefore, it is possible that attention to

some of these common errors will make a major contribution to success in problem solving. In order to illustrate this, four kinds of computational difficulties will be discussed briefly.

(1) The commonest cause of errors in arithmetic is lack of mastery of the number combinations. This is a factual rather than logical kind of learning, but there is no substitute for it. Pupils who do not know the number combinations resort to counting or splitting numbers. In one study, carried on in an excellent school system, it was found that even at the eighth grade level 94 of 106 pupils made errors in combinations when adding. Sixteen of them still resorted to counting when they did not know a combination and 27 of them split numbers in order to get a sum. In grades three to six, errors in combinations, counting and spliting numbers were by far the most frequent faults in adding. When solving problems, wrong answers due to errors in computation are just as wrong as those due to errors in logical thinking.

(2) A second cause of computational errors is failure to understand the four fundamental processes, which results at times in using the wrong process and at other times in not carrying on properly the operations that the process requires. Many wrong answers to problems are due to errors in the carrying process in addition where pupils may carry the wrong number, forget to add the carried number, or simply fail to understand the nature of carrying. Borrowing in subtraction occasions similar difficulties. Process errors in long division are particularly troublesome because they involve not only the division process itself but also the processes of multiplying and subtracting. Results in solving problems can often be improved by helping pupils understand the operations involved in the four fundamental processes.

(3) Since a large proportion of problems require the use of fractions, decimals and per cents in one way or another, a third way of improving results is to help pupils see the relationships among these three kinds of numbers. Although it is customary, and perhaps desirable, to treat these three topics separately, it is necessary eventually to bring them together and to show that they are only three different ways of treating the relation of parts to wholes. Many pupils never understand that decimals are simply fractions written in a different way and that per cents are a special kind of fraction where the denominator is always one hundred. If the similarities among these three topics can be made clear, pupils will then be ready to understand better the few ways in which they are different.

(4) Finally, problem-solving thinking can be helped a great deal by clarifying the functional relations represented by a simple equation. If pupils can really understand situations represented by the facts that if $6 = 2 \times 3$, then $2 = 6/3$ and $3 = 6/2$, it would help mightily in solving problems. However, many pupils never really master the logic and the skills involved in such functional operations. The writer has found that this difficulty persists with many students even to the college level. Many of the problems in arithmetic, such as commission, interest, rate, area and volume, etc., require this type of functional thinking. Skill in such operations is essential to problem solving.

Summary

Teaching pupils to solve problems is always a two-pronged operation. First,

pupils must learn to use the same straight-forward common sense in arithmetic that they use in dealing with perplexing situations outside of school, and second, they must master the skills of computation so well that the number operations in a problem can be carried on automatically, leaving their minds free to concentrate on the logical thinking that is necessary. It is proposed here that, as far as present knowledge indicates, it is better for teachers to make individual diagnoses of pupils' thinking in solving problems and then to help them correct fallacies in thinking and errors in number skills rather than to teach pupils to go through some set pattern of steps that is supposed to be "the way" to solve problems. The reason for this proposal is that when a pattern of solving problems is formalized and reduced to a stereotyped habit the pupil is likely to stop thinking. Yet, solving problems is the one situation in life where alert thinking is most important and where stereotyped behavior is least desirable. Habit can take care of the number skills if they are mastered thoroughly, but it is the very nature of problem solving that it deals with *new* situations where habitual behavior is inadequate. That is what makes problems. One reason for confusion here is that textbooks often fail to distinguish between arithmetical exercises, where the pupil already knows what to do to get the answer, and arithmetical problems, where the pupil has to discover the method of solution. Where problems are real, rather than just exercises, research has shown that even competent adults follow many different patterns of thinking in solving them rather than resort to a single stereotyped set of steps. The key to teaching problem solving is the teacher's ability to detect how pupils think as they solve their problems and then to help them to correct their errors and to think more effectively.

BOOK REVIEWS

THE MENTALLY RETARDED CHILD. By Max L. Hutt and Robert G. Gibby. Boston. Allyn and Bacon. 1958. $4.50.

Those who are working with mentally retarded children, and those who are planning so to do, will find this text comprehensive, much to-the-point, and up-to-date. The authors, both clinical psychologists and teachers of wide experience, view the retarded child as a living, developing, and adjusting individual with its own unique needs for affection and individual expression. Such topics as the personality development of the retarded child, his emotional reactions, the emotional reactions of his parents, and the personality disorders of the mentally retarded and their treatment are considered. Because of its great wealth of material and its logical organization, the book will serve admirably as a university text and as a reference for workers in the field.—W. P. S.

INTRODUCTION TO PSYCHOLOGY. By Clifford T. Morgan. N. Y. McGraw-Hill. 1956. $6.50.

Professor Morgan of the Johns Hopkins University enlisted the aid of fourteen experts in the various fields of psychology in the preparation of this volume. The text, therefore, presents more vital ideas than a single author could muster. A major aim of Dr. Morgan was to provide a text so flexible in organization and content that it could serve the needs of rather different beginning courses in psychology. Another cogent characteristic of the book is its recognition that most students in introductory psychology will not become majors in psychology. The material of the text, extensive as it is, is so arranged that individual instructors can select chapters to meet their individual needs.

—W. P. S.

Evaluation in Arithmetic

LEO J. BRUECKNER

UNDOUBTEDLY the most effective method of determining the effectiveness of the arithmetic program in elementary schools is to make an evaluation of the educational product. When the behavior and reactions of the learners exhibit the characteristics related to arithmetic that are regarded as desirable, we can be quite certain that the instructional program is producing the results that are being sought.

The first step in evaluation is the formulation of the objective of arithmetic instruction that both school and community regard as desirable. In modern education these objectives are commonly regarded as being of three different types. They are:

1. The specific more or less technical outcomes that are directly related to arithmetic
2. Those outcomes that are related to some aspect of child development and growth
3. Broader outcomes that are concerned with social objectives to which all areas of education contribute.

The first of these three objectives includes such specific outcomes as an understanding of our decimal number system and of the ways in which it functions in number processes, and skill and power in number operations. This list also includes a comprehension of the nature and functions of measurement, the ability to apply quantitative concepts and procedures effectively in social situations that arise in the affairs of daily life, and insight into the role and uses of number in all areas of learning. The second category includes such outcomes as the interest of the learner in arithmetic as a field of study, his attitude toward the subject, his emotional reactions toward it, and his readiness and willingness to make the effort necessary to master it. The third category includes learnings of a broad societal significance, such as the ability of the learner to cooperate effectively and creatively with the members of his group in dealing with mathematical aspects of problems of vital significance that arise in social sitations both in and out of school.

This threefold range of outcomes of instruction in arithmetic is much broader and more varied than the narrow limited learnings that are so frequently regarded as of primary importance by teachers and specialists in mathematics. Too often teachers regard computational skill as the major objective of arithmetic instruction. They overlook the importance of many other outcomes described above that are of obvious importance in planning and evaluating the arithmetic program.

Numerous ways have been devised for evaluating the extent to which the accepted objectives of instruction in arithmetic are being achieved. The four most widely used methods of appraising the behavior of the learners with respect to the various outcomes discussed above are:

1. Measurement
2. Testing

3. Observation
4. Interviews with the learner and his associates.

Measurement means the use of standardized instruments which give us a measure of the individual's level of achievement as compared with that of other children of his age and level of development. Formerly the scope of standardized tests was limited almost altogether to the appraisal of computational skills and the ability to solve verbal problems. In recent years measuring devices have been constructed which deal with such important outcomes as insight into our number system, the ability to interpret graphic and tabular materials, and knowledge of the social applications of arithmetic.

Testing means the use of less formal procedures for securing a record of some kind about the pupil's ability in some aspect of arithmetic. For example, the record may show the use of teacher made tests, objective types of examinations, unstandardized tests found in textbooks, records of performance on daily assignments, and similar procedures used by most teachers to determine the pupil's grasp of what he is learning.

Observation, the third basic method of evaluation, is used to appraise pupil performance in areas of learning that are not readily checked by paper-and-pencil methods. For instance, the teacher can observe the actions and responses of a learner to determine how systematic and effective his methods of work are, how interested he is in what he is studying, and whether or not he is experiencing difficulties of some kind. Also the teacher can observe what the pupil's relations are with his associates while the pupil is participating in some group activity involving a project or the solution of a problem that is of concern to the group. The teacher and children together can set up standards and criteria that can be used to examine and evaluate an activity or a report based on information gathered from a variety of sources.

Personal interviews, the fourth major method of evaluation, involves the use of questions, check lists, inventories, anecdotal records, tape recordings, and similar procedures. These data are useful in securing types of information of various kinds about such items as interests, attitudes, experiences, methods of thinking and study, understanding of the work, learning difficulties, and other items of similar nature.

The results of standarized tests of computational skills are relatively easy to interpret because the outcomes tested are quite specific. Norms based on the results of the tests administered to children in all parts of the country are available. Usually the results of standardized tests show a wide range in the arithmetic ability of children at all levels of the school. The higher the grade level, the greater is the range in pupil performance and mastery. It is much more difficult to evaluate such important but less tangible outcomes as insight into the nature of the number system, interests, attitudes, and the ability to apply quantitative procedures and methods of thinking effectively in social situations. To evaluate these and similar valuable outcomes, the teacher and others, particularly parents, who are concerned with child growth and development must make judgments on the basis of a careful scrutiny of the behavior of the learner in social situations. Obviously it is also highly desirable that the learner himself should participate directly in the evaluation of his be-

havior. The improvement of reports to parents reflects the efforts of the schools to give a broader and a more meaningful evaluation of the growth of their children.

Evaluation is a continuing process that may be applied at any time in the course of the learning activity, regardless of the level of success the learner is having in mastering arithmetic. On the basis of information secured by any or all of the four general methods of evaluation described above, the staff of the schools and all concerned with child growth and development can make judgments as to the effectiveness of the arithmetic program. Then the combined groups can plan any necessary adjustments when the need is evident. These adjustments should be made for children of all levels of ability. They should include those children whose achievements indicate unusual aptitude for arithmetic, those whose performance is normal and in general at a relatively satisfactory level, and those who for some reason are not making the progress that is to be expected of children of their level in ability and stage of development. The teacher faces the problem of enriching the work in artithmetic for the children in the first two categories, particularly the gifted learners. Also the teacher should make necessary adjustments in the instructional program that will broaden and improve the achievements of the third group.

When it appears that the outcomes of the arithmetic program are not satisfactory in one or more aspects, the teacher with the aid of available consultants should examine the situation to determine possible factors in the total learning situation that may be contributing to the unfavorable conditions. Experience has shown that the causes of unsatisfactory growth may usually be identified by an analysis of four major elements of the learning situation, namely, (1) the curriculum, (2) instruction, (3) the materials of instruction and the socio-physical environment both in and out of school, and (4) the characteristics of the pupil himself. For example, a systematic examination and evaluation of the curriculum may show that important objectives are being overlooked. The contents of what is being taught may be so limited in scope that basic areas of subject matter receive little if any consideration. Besides, the content may be much too difficult for some of the children, may not be well organized, may have little social significance, and may not appeal to the children as being worth while. Under such circumstances inferior results certainly can be expected.

It is obvious that the quality and skill of instructional procedures may affect outcomes unfavorably. It is often seen that teachers treat all children in the same way, regardless of the wide range there is in their levels of achievement and learning potential. It is also true that teachers differ in their teaching skill, in the care with which they plan their instruction, and in their ability to present arithmetic meaningfully. Teachers sometimes fail to give adequate attention to problem solving and to the many applications of number and quantitative procedures that arise in other curriculum areas and in the life of the community. Unfortunately some teachers do not know how to locate and diagnose pupil difficulties or how to correct these difficulties when once they have been analyzed. The result is that weaknesses tend to accumulate and a gradual breakdown in arithmetic results.

Learning is also affected by the quality and adequacy of instructional ma-

terials. A well planned interesting enriched arithmetic textbook is an essential tool of learning. At the present time textbooks differ widely in the attractiveness and appeal of their contents. Some textbooks provide materials especially intended for the enrichment of learning experiences of the more capable learners. In modern classrooms a variety of learning aids supplement the textbook so as to add to the concreteness of learning experiences and to make the learning of arithmetic more meaningful. The article on page 267 discusses the use of supplementary learning aids in arithmetic. The adequacy of supplementary materials and their use are vital factors in an effective program in the teaching of arithmetic.

Obviously the characteristics of the learner himself also affect what he learns about arithmetic. He may have neither the mental ability required to master what he is being asked to learn nor the ability to read well enough to understand the contents of the textbook he is using. He may be handicapped in some way physically which interferes with successful learning, such as poor vision. He may not be making an aggressive attack on the learning of arithmetic because of indifference and a faulty attitude toward the subject for many different reasons, especially lack of success. Finally, the home environment from which he comes may be limited and little is done to stimulate his interest in arithmetic or to guide his learning experiences. These items illustrate the multitude of conditions that are sure to contribute to the unfavorable development of the child in the field of arithmetic.

The analysis of the data gathered by systematic evaluation of the product should be a cooperative undertaking participated in by all who are concerned with the child's growth and development. The same thing is true for the analysis of factors contributing to unfavorable development of the learner, including the curriculum, instruction, materials, and characteristics of the learner himself. The purpose of these analyses should be not only the identification of these factors but also to provide a basis for the planning of steps that can be taken to bring about an improvement in the total situation. The improvement program should be many sided so as to meet the varying needs of members of the staff and of the learners. It may be decided that there is a need of improving the curriculum in arithmetic. In many places such programs have been planned cooperatively and carried out by the members of the staff in conjunction with parents and other interested members of the community. Teachers may feel the need of improving and modernizing their instructional procedures. Workshops and study groups have been effective in achieving these goals. Instructional materials have been improved by means of workshops, exhibits, demonstrations, field work, and visitations. In some communities excursions by teachers to places of business, industries, historical spots, and similar activities have been planned and carried on by local teacher's associations and groups of business men. These activities have enriched and broadened the backgrounds of the teacher so as to enable him to vitalize instruction in arithmetic. In many places systematic steps are being taken to assist the teacher to evaluate learning outcomes in arithmetic and to diagnose and treat learning difficulties that children frequently encounter. A systematic comprehensive program of evaluation is a basic necessity in improving the instructional program in arithmetic.

A Mathematics Curriculum for the Elementary Schools

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THE building of a curriculum implies starting with a design based on a firm and stable foundation. It is not a one-man or one-committee job. For a curriculum program to proceed beyond the paper-and-pencil stage, parents, pupils, teachers, supervisors, and other interested groups must have a perceptible part at some stage in its building. This is necessarily a slow process. There are always some who recommend shortcuts, but there are no shortcuts to genuine curriculum building. This is a process which involves continuous change in teachers' thinking and action. There are those, impatient with the almost imperceptible gains, who recommend going back to the "good old days,"—days that never actually existed. So far as elementary mathematics is concerned, the inertia is particulary great because of the many years of time and effort invested in the old ways by all people concerned in curriculum building at the elementary school level.

In the fall of 1945 the first steps toward building a mathematics curriculum at the elementary school level were taken in New York City. Conditions were right for this venture at this time. The entire elementary curriculum was being reorganized for the first time in 20 years or more. There was a widespread expression of dissatisfaction from all school levels and from the public with the results obtained from elementary mathematics. The Division of Elementary Schools was planning a program of remedial arithmetic which was to involve the use of 23 classroom teachers, one from each field superintendent's district. The administration had recently organized three strong research divisions, one of which was concerned with curriculum research. A curriculum research project was in operation in classes of elementary school for intellectually gifted children from various parts of the city. Progress with these children was apparent in all areas of the curriculum with the exception of arithmetic. Eventually the gifted children themselves were asked for suggestions. In many of these classes children said in effect: "We'd like to *understand* what we're doing in arithmetic." At this time a growing number of educators, through the medium of professional publications, advocated meaningful arithmetic and a program of this kind was being tried out experimentally in the Detroit Public Schools. In New York City, therefore, where research was valued in curriculum building and where a need for meaningful arithmetic was expresed by the children themselves, a favorable climate existed for trying out and experimenting with recommendations made by leaders in the field of mathematics education.

Planning and Initiating the Program

In New York City all elementary curriculum research and development must be planned and conducted cooperatively with the elementary school level division of school organization. This is a great advantage. Although this administrative procedure "slows up" curriculum research and curriculum production, it is a guarantee against studying problems or preparing materials that cannot be put into practice. Moreover, the planning period necessarily becomes one of teacher and supervisor training. This creates relatively favorable conditions for conducting research along new fronts. The planning creates the machinery for getting workable procedures from teachers and for the tryout of tentative materials as they are produced. Occasionally, however, research and production are delayed for so long that interest in and enthusiasm for a particular project wane markedly. These periods did occur from time to time, but renewed enthusiasm was continually engendered by encouragement from educational leaders throughout the country. As one leader said: "New York City can't fail. If it does, mathematics education at the elementary level will be set back a century."

Long-term and short-term programs for research, production, and implementation were made. The long-term program was planned to include increasing numbers of school and lay people in research, production, and implementation, and to lessen the differentiation among these three aspects of curriculum development. The short-term plan involved two parallel programs. One was a program of research in a limited number of classes and the other, a program of experimental tryout of preliminary teacher training bulletins on a city-wide basis. This created continuous pressure from the field for more research and more production. The many problems faced by teachers and supervisors in the field kept interest high in teaching elementary mathematics and served as motivation for increasing numbers of teachers to study and to teach meaningful mathematics. Each new criticism served as a challenge, to be considered for investigation by superintendents, principals, mathematics coordinators, classroom teachers, teachers and supervisors at the junior high and senior high school levels, parent groups, the press, and educators in local teacher training institutions.

From the beginning, teachers, supervisors, and researchers worked together as peers. Since meaningful mathematics was new to all alike, new learnings were necessarily shared by everyone, and official lines of authority were temporarily set aside. Perhaps no other one factor can be said to have contributed more to building a sound mathematics curriculum at the elementary school level. Teachers were free to experiment without fear of censure. Supervisors felt free to ask for help from teachers or mathematics coordinators or researchers or anyone else. Researchers were free to ask for experimentation on the part of any teacher, and to request professional help anywhere in the United States.

The meaningful approach in arithmetic was tentatively stated in three different ways: (1) An overview and general statements for the K-2, 3-4, and 5-6 grade levels, in a publication for all teachers and supervisors; (2) a detailed outline of a curriculum research project for a selected group of supervisors; (3) a bulletin for experimental use by all

primary grade teachers. Experimental bulletins were prepared later for use by teachers in Gardes 4, 5, and 6.

During the first phase of curriculum building the research was very little ahead of the city-wide experimental tryout. The research involved studying children in their classrooms with particular emphasis on finding out how children at varying levels of ability think when certain tasks were presented and when certain types of materials were made available. City-wide experimental tryout started with Grade I (1948-49), and proceeded one year at a time through the grades. Traditional standardized tests in arithmetic were administered periodically in the classes involved in the research. These tests also were administered to all children during the sixth grade. This was essential in order to reassure parents and teachers that the experimental program was at least "as good as" the memoriter drill-type program it replaced.

Increasing Participation in Building the Curriculum

Thousands of teachers were trying out meaningful procedures for the first time each year, beginning in 1949. (New York City has approximately 20,000 public elementary school teachers.) How were teachers and their supervisors implementing the meaningful program? What were their problems? Since personal opinion and rumor could not be considered facts, plans were made to involve more teachers and supervisors as participants in the curriculum building process. Several procedures were followed:

1. A group of principals and assistants-to-principals organized a study and action research group. They met several hours a week for a period of three years. They concentrated their attention on problems pertaining to grades 4, 5, and 6. They planned research to be conducted in their schools, shared experiences, raised questions, evaluated their programs, and submitted reports.
2. A group of instructors from local teacher training institutions met in a weekly workshop to learn about meaningful mathematics. Later they discussed the problems they faced in organizing a program for supervising student teachers in New York City elementary school classes.
3. A group from among the Elementary Mathematics Coordinators organized a weekly workshop and outlined a program to provide a two-way flow of mathematical sequences, experiences, procedures, and similar things to and from the teachers and supervisors in their districts and to and from those involved in preparing bulletins and directives.
4. Questionnaires were sent to the teachers of grades 1-2, 3-4, and 5-6 in several districts, to be answered anonymously. Only three questions were asked: What curriculum materials do you find most helpful and why? What curriculum materials do you find least helpful and why? What curriculum materials do you think should be prepared and why? Approximately 90 per cent of these questionnaires were returned.

Other develoments also contributed to increasing the number of people and groups participating in curriculum building. The Board of Examiners increased its emphasis on meaningful mathematics, year by year, in its examinations for supervisors and teachers. This gave impetus to the pre-service and to the in-service training programs, as well as to participation in curriculum development at the school, district, and

city-wide levels. Organizations of parents became particularly interested in elementary school mathematics. Requests for talks, workshops, and courses dealing with arithmetic were so numerous that they had to be met by the local supervisors and teachers.

As children who understand some meaningful mathematics were proceeding through the grades, the upper schools were getting ready to adjust their curriculum programs to meet the needs of this group of children. The Division of Junior High Schools organized a mathematics curriculum committee to prepare materials to be used by the teachers at this grade level. The Division of High Schools is now considering revisions for students at that level.

Teachers' Problems in Building a Curriculum in Mathematics

It is important to aim at involving all teachers and supervisors in building a mathematics curriculum. In doing this, curriculum research, production, and teacher training become part of a single plan. Although this results in a curriculum in action as well as in theory, it creates many problems as well. Some of these, briefly stated, are

1. Teachers are not always able to identify their problems and to express what these really are. For example, teachers may indicate that directive is "too verbose" or "not clear" or "too long." What they may really be saying is that they don't see what to do with it in their classrooms.
2. Teachers are likely to over-estimate understanding on the part of their children. Many teachers judge children's learning by responses to questions given.
3. Teachers do not realize how much there is to learn about the structure of elementary school mathematics.
4. Teachers who are willing to try new procedures are sometimes discouraged from doing so by neighboring teachers. Teachers who are willing and able to experiment should be encouraged to do so by being relieved of some time-consuming school duties.

The description of the plan followed in building a curriculum in elementary mathematics in New York City necessarily is brief. The plan may not be usable in smaller communities. Regardless of the size of the community in which such revision is undertaken, it is necessary to have all groups who are interested in education participate in the endeavor. In any extensive program of curriculum revision and construction, there are inevitable obstacles and difficulties to be overcome. However, the advantages far outweigh the undesirable features when the function of the program is to enable teachers to do an effective job in instruction in elementary mathematics.

Arithmetic Preparation for Elementary Teachers

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THE mathematics curriculum of the elementary school in the past twenty-five years has undergone considerable change. Essentially, the change has not been in content, but in the approach that the student is induced to take to the content.

At the risk of over-simplification, this change may be described as a switch in emphasis from rote learning of arithmetic, in which stress was placed on speed and verbal retention to an emphasis based upon the psychological principle that the better one understands something, the faster he learns it and the longer he retains it.

To date this shift in emphasis has produced a range of effects. Aside from its near-universal acceptance by leaders in the field of mathematics education, its most significant impact has been on the arithmetic textbooks written for use in the elementary classrooms. This is not surprising, since most elementary arithmetic texts are written by this same corps of leaders in the field of mathematics education.

But on the whole it appears that the impact of this change in emphasis has, in varying degrees, been less keenly perceived at other vital levels: those of the classroom teacher, the elementary school supervisor, the school principal, and the curriculum maker in teacher preparation institutions. Because of such uneven percolation, problems arise.

Teachers Complain

For instance, teachers complain to publishers that their textbooks are unteachable. Upon investigation it is usually found that the teacher, with Procrustean determination, is trying desperately to adjust the new-approach text to her outmoded preconceptions of the subject. The approach of the troubled teacher is not necessarily invalid, but certainly she is using the wrong tool when she selects any of the better modern textbooks in arithmetic. And it might be stated parenthetically that she will likely find it rather difficult, these days, to locate a textbook series that is congenial to her viewpoint.

The problem is much the same when former teachers are persuaded to return to the classroom after lapses of fifteen years or so. Supervisors are frequently heard to remark that "breaking in" a brand new teacher is, in many respects, much easier than "reorienting" a former teacher—and this goes double for the mathematics phases of the curriculum.

At the school-principal and other higher administrative levels another facet of the problem appears. Here the administrator, typically less conscious of the tremendous changes that have taken place, tends to think in terms of what arithmetic was in his day, when proficiency in arithmetic was measured by speed of computation, when understanding of the subject was equated with a

facility at mechanical manipulation of symbols. As a consequence, he is prone to diagnose teacher difficulties with arithmetic as either deficiency in manipulative computational skills or, more likely, a want of the right "techniques." Some administrators might well find the results gratifying were they to redirect a portion of their teachers' inservice-workshop time from the usual quest for the perfect "gadget" or "technique" to a mature consideration of the fundamental concepts of arithmetic itself.

In the curricula of the teacher preparation institutions of our country a point of view similar to that of the aforementioned administrator is all too evident. Grossnickle's study (2) in 1951 verified this when he found that among the 129 state teachers colleges—all members of the American Association of Colleges for Teacher Education—two-thirds of those offering curricula for preparing teachers for the kindergarten and primary grades, and more than half offering curricula for preparing teachers for the intermediate and advanced grades required no background mathematics course. Layton (3), in a similar study of 85 teacher colleges, found that only 2 out of 5 required of their prospective elementary teachers as much as one course in background mathematics. Furthermore, according to Weaver (5), the situation is considerably worse in the teacher-preparation curricula of liberal arts colleges and university schools of education.

"Brush up" preparation

If one grants the premise that mechanical proficiency in computation is equal to and interchangeable with understanding of arithmetic, then the point of view currently held by the majority of the curriculum makers of our teacher preparation institutions is valid. All the prospective teacher needs to do, under this premise, is to "brush up" rusted arithmetic skills and she is ready to cope with the arithmetic curriculum of any grade. Consequently, there is no need to offer a college course nor to dignify such a "brush up" with college credit.

But the premise cannot be granted with impunity. Mechanical proficiency is not equal to and interchangeable with a true understanding of arithmetic. Studies such as those conducted by Glennon and Orleans attest to this.

On a test of 80 items covering basic concepts of the decimal system of notation, the integers, fractions, decimals, and the rationales of computation—all pertinent to instruction in grades one to six—Glennon (1) found that the teachers in service in his sample had control of only 55% of these fundamental and important understandings. Moreover, the study showed that there was no significant difference in achievement in these basic understandings between students who had taken a methods course in "Psychology and Teaching of Arithmetic" (whether at the graduate or under-graduate level) and students who had not. Of particular interest to those concerned with inservice preparation of teachers should be Glennon's finding that this meager knowledge of basic arithmetic concepts had about zero correlation with years of teaching service. In other words, added experience in teaching arithmetic is no guarantee that the teacher will grow in her understanding of the subject.

Orleans (4) reported essentially the same drab picture after a study of some three hundred teachers in service in New York, Colorado and Illinois. Among his specific findings: 3 out of 5 did not understand partial products in long division, 7 out of 10 did not understand changing fractions to low-

er and higher terms, 2 out of 3 did not understand the meaning of per cent, 2 out of 5 did not know that ten is the base of our system of number notation.

It is extremely unlikely that the curriculum makers for teacher preparation institutions would be willing to accept a history background for teachers-to-be that was comprised of, say, a mastery of the bones of history as listed in some outline-type of text; or for their geography preparation a similar mastery of the superficial details of an atlas. Yet many of these same people seem to exhibit no hesitancy whatever in justifying the arithmetic preparation of such potential teachers with a complete ignoring of the subject, or with possibly a "course" using a seventh or eight grade text, as Grossnickle (2) actually found in some instances.

Not mumbo-jumbo

It is imperative that persons of responsibility in teacher education recognize that arithmetic is *not* a mumbo-jumbo ritual that needs only to be memorized to be mastered. They must come to recognize that arithmetic is an important and basic way of thinking, that it permits of varying levels of insight and appreciation. Furthermore, this insight and appreciation increases signicantly with the increased maturity of the beholder. It is folly indeed to believe that a person has reached his arithmetical saturation point at the end of the eighth grade when formal instruction in the subject traditionally terminates.

If the good teacher were but a human phonograph record, then all that would be necessary in his preparation would be to somehow grove him with exactly that amount of subject matter that he would need to render in the classroom. But the making of a good teacher is not so simple. Anyone who has taught anything from knot-tying to the most esoteric of subject matter fully appreciates the inestimable value of depth of understanding in the area in which he is teaching.

This depth of understanding is what the typical classroom teacher so woefully lacks in arithmetic. This is why she cannot use her textbook to anywhere near full advantage; the text reflects a depth of appreciation held by its authors that the average teacher has never even begun to suspect. This is why publishers now find it necessary to supply a teacher's manual for each grade text—a manual which is frequently larger than the text itself. As with a lake in the dead of winter, all that is perceived by many teachers of arithmetic is its frozen surface; there is little or no awareness of the depths that exist beneath its static crust.

Current Signs

There are current signs, however, that this need for depth in subject matter beyond the demands of a given grade level is beginning to receive recognition from curriculum makers in some teacher preparation institutions. In recent years, in the curricula of these places, there has been a steady and significant increase in the ratio of general education to professional education. But generally encouraging as this trend is, it has not been an unmixed blessing in the mathematics preparation of elementary teachers.

Often, the mathematics share of this increased emphasis in general education has been in the direction of the usual college algebra-trigonometry-analytic geometry seqence. In spite of the fact that such added mathematical exploration undoubtedly broadens the perspective of these future teachers, it actually makes little direct contribution to that area of

mathematics in which these persons are weak, yet will teach: arithmetic.

The greatest stock-in-trade for the elementary teacher, mathematically speaking, is a thorough knowledge of our system of number rotation—an item that is usually taken for granted by branches of mathematics higher than arithmetic. Only in the most recent algebra texts is so much as a brief reference made to this all-important topic. The matter of algorisms, the rules or patterns we follow in computation, require the most careful scrutiny and understanding by persons who aspire to be competent teachers of modern arithmetic. But in algebra we simply take for granted the operational phases of addition, subtraction, multiplication and division.

Also there is the matter of the different species of number expression: the whole number, the fraction, the mixed numbers, the decimals, the per cent. How are they alike? How are they different? How are they related? These distinctions are all neatly avoided in algebra where that comprehensive enigma, the x, can stand for one or all of them.

Many persons who are not especially conscious of the mathematical demands of the typical elementary classroom have a tendency to take these important basics as a matter of minor relevance—that is, until faced with the embarrassing question of some intellectually curious moppet who wants to know why you add the figures in a column and not across, or why you indent when you multiply, or why you invert the divisor in division of fractions, or why, why, why, *ad infinitum*.

It will be patent to all who will consider the matter closely that the typical algebra course, or trigonometry or analytic geometry course for that matter, despite its "rounding-out" values, simply does not provide the necessary insights into the basic concepts of elementary arithmetic at the required level of sophistication. What is needed is coursework specifically designed to meet the specific mathematical demands of the elementary classroom; coursework that will provide the elementary teacher with a mature awareness and appreciation of the foundation elements, of the diversity and interrelatedness of the myriad parts which go to form the structure of arithmetic; coursework that will provide a consciousness of the whole against which one may, with security and understanding, teach the segments of the subject pertinent to a given grade level.

Only with such college-level coursework, with such a specific objective, will we be able to maximize the output of teacher competence in arithmetic with what, in an already overcrowded teacher-education curriculum, will perforce be limited input.

BIBLIOGRAPHY

1. Glennon, Vincent J., "A Study in Needed Redirection in the Preparation of Teachers of Arithmetic," *The Mathematics Teacher*, 42:389-96; December, 1949.

2. Grossnickle, Foster E., "The Training of Teachers of Arithmetic," *The Teaching of Arithmetic*, Fiftieth Yearbook of the National Society for the Study of Education, Part II. pp. 203-31. Chicago: University of Chicago Press, 1951.

3. Layton, W. I., "Mathematical Training Prescribed by Teachers Colleges in the Preparation of Elementary Teachers," *The Mathematics Teacher*, 46: 551-56; December, 1951.

4. Orleans, Jacob S., *The Understanding of Arithmetic Processes and Concepts Possessed by Teachers of Arithmetic*, Publication Number 12, Office of Research and Evaluation, Division of Teacher Education, College of the City of New York, New York 22, N. Y., 1952.

5. Weaver, J. Fred, "A Crucial Problem in the Preparation of Elementary-School Teachers," *The Elementary School Journal*, 56:255-61; February, 1956.

Are Soviet Educational Methods Appropriate for American Schools?* Part III

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Part III: Ends Dictate the Means

THROUGHOUT history there have been no ideal ends which were attained with non-ideal, inhumane means, just as there has been no free society which was built by slaves. Nothing so well reveals the reality and greatness of ends as the methods used to attain them.[15]

With these words, written in a cell to which he has been confined, Milovan Djilas, ex-Vice President of Yugoslavia, characterizes the relationship that exists between the goals sought by a society and the means employed to realize these ends. The relationship between means and ends has been made explicit many times before by competent students of society and probably more fluently, but the uniqueness of Djilas' statement lies less in the language employed than it does in the realization of Djilas's former position in the Communist hierarchy. These are the words of a disillusioned man who sees Communist ideology in perspective.

We now turn to the ends implicit in both Communist writing and the philosophy of an American free society. Only when we examine closely the divergent aims of these two societies and reappraise the means used to attain these ends can we readily see an answer to the question posed early in this article, *viz.*, "Are Soviet educational methods appropriate for American schools?"

What are the aims of Communism?

In an analysis of Communist aims, care must be taken that one early identifies the difference between the aims of the early Communist movement and the aims of post-Marxian communists. As an example, in pre-revolutionary days Marx and Engles envisioned Communism being embraced by the majority of the proletariat or working class;[16] hence the name *Bolshevism* the Russian word for majority. However, in 1918 Lenin perverted the concept of the majority when his Communist Party—a fraction of the total population—seized the reigns of government from Russia's first and only democratically elected government. Since this is but one of countless perversions of original doctrine it becomes necessary to analize Communist aims in terms of post-revolutionary doctrine rather than original

*This is the third of a series of four articles on education in Soviet and American schools by Professor Herbert C. Rudman.

15. Milovan Djilas. *The New Class: An Analysis of the Communist System.* (New York: Frederick A. Praeger. 1957) p. 162.

16. Karl Marx and Frederick Engels, *The Communist Manifesto* contained in an anthology of Marxian essays, Karl Marx. *Capital* (New York: The Modern Library, 1932.)

Marxian philosophy. The creators of contemporary communist aims are Lenin and Stalin. It is from the writings of these men that the aims of Communism can be identified.

Lenin and his followers set for themselves three tasks. The first was "conceived in terms of the total socialization of industry, trade, and finance, the collectivization of agriculture, and the industrialization of the economy."[17] To achieve this goal a series of five-year plans was inaugurated in 1928. The rallying cry of the Communists was, "From each according to his ability, to each according to his work."

A second aim of Leninist Communism was the expansion of the concept of Rusian Communism to that of international Communism. The aim of Bolshevists since Lenin's time has been the complete collectivization of all mankind.

The third major aim of contemporary Communism was the worldwide dissemination of Marxist-Leninist dialectical materialism. Dialectical materialism is a method of studying nature and its phenomena and is dialectical in its interpretation, *i.e.*, it views nature as being in constant movement and undergoing constant change. The theory of dialectical materialism is non-spiritual. "Marxist philosophical materialism holds that the world is by very nature *material*, that the multiple phenomena of the world constitute different forms of matter in motion, that interconnection and interdependence of phenomena . . . . . are a law of the development of moving matter, and the world develops in accordance with the laws of movement of matter and stands in no need of the universal spirit."[18]

That the tasks that the communists set for themselves are great, no one can deny. Implicit in these tasks is the rôle that the schools would play. Education has been viewed from the time of Marx as an indispensable political weapon. The school was not viewed as an important factor in bringing about the revolution. Instead, party philosophers condemned education as the tool of the bourgeoisie, used by them to maintain their own status and to oppress the proletariat. However, the same party philosophers viewed the rôle of education after the revolution as the creator of the new Soviet citizen. Education had assigned to it the role of re-making the individuals who composed the Communist society. This meant that the schools had first to eliminate all traces of capitalistic thinking. The schools were charged with the responsibility of indoctrinating a population in the teachings of Marx, Engels, and Lenin. This meant re-orienting the pre-revolutionary citizen to a new concept of the nature of the universe and laws of social development (dialectical materialism); it meant the orientation of the Soviet citizen to the policies of the Communist Party and to the acceptance of the Leninist goal of ultimate world Communism. It meant that the Soviet schools were charged with not only developing literacy among the populace but with shaping the very thoughts they held. It meant instilling within the Soviet citizen a loyalty to Communism so strong that it could endure the ever-shifting party line.

These then, are the aims of contemporary Communism. They are not the

17. George S. Counts, *op. cit.*, p. 39.
18. *History of the Communist Party of the Soviet Union*, edited by a Commission of the Central Committee of the Communist Party of the Soviet Union. (Moscow: Foreign Language Publishing House, 1943).

aims of Marx—the aims which proposed the freeing of the working man from bondage. They are not the aims of Marxian philosophy which declared that there would be a classless Utopia for a class system has developed within the Soviet Union: the party members (characterized by Djilas as the "new class") as opposed to the rest of Soviet citizenry. These aims call forth means of a specific nature. What is the character of the means employed to meet contemporary Communist aims?

The means used to implement Communist aims

As we have seen in the preceding sections, Soviet education is built around a concept of service-to-the-state. This service-to-the-state notion calls forth certain specific practices; practices which are designed to develop a conforming, non-questioning Soviet citizen. Obviously, this kind of individual cannot be developed through an educational system which encourages freedom of ideas and the freedom to exchange these ideas between men. To develop the compliant citizen, Soviet education employs various means which adhere to the following principles:

The state practices complete monopoly over all educational practices

The sole determiner of the curriculums, methods of instruction, and materials of instruction, in Soviet schools is the Central Committee of the Communist Party. So powerful is the Central Committee that it extends its influence beyond the school and reaches into every nook and cranny of the individual's life. Education in the USSR is more than a school-oriented education. It is a political weapon. In the battle for men's minds Soviet education must, of necessity, be all embracing. Soviet education is political education, it is moral education, it is an esthetic and cultural education, it is, above all, the narrow training of the specialist. Soviet education reaches into the prison and "rehabilitates" deviationists; it reaches into the armed services and educates the military, it reaches into the nursery and educates the child at play.

The State practices complete secularization of education

In order to ensure the perpetuation of the concept of historical and dialectical materialism, the Soviets have consistently denied the existence of spiritual concepts. This has meant that the Communist Party has based its education upon a material approach to life. Since there is in life only the material and not the spiritual, education has taken on an atheistic flavor.

As far back as 1929 one of many societies formed outside the school was "The League of the Militant Godless." The league was composed of youngsters from age fourteen to adulthood. It had a younger companion, "The League of the Young Militant Godless." Counts describes an interesting way in which the league influenced school practices.[19]

> An interesting example . . . is a simple problem in arithmetic which appeared in an approved textbook in the second grade published in 1936: "Find out how many children in your grade are members of the League of Young Militant Godless." Treat separately the boys and the girls. Draw in your notebooks two columns of squares. One column should represent the godless boys, the other—the girls. Over the diagram write: 'The Number of Godless in the Second Grade.' Under the

19. George S. Counts, *op. cit.*, p. 107.

column write 'Boys,' 'Girls,' Along with the diagram indicate the scale on which it is made.

During the war years the Soviet Union relaxed its anti-clerical attitude. Since the end of the war dispatches from Soviet newspapers have indicated an increasing concern for the lack of anti-religious teaching in Soviet schools. Seminars have been held in many of the Republics to address themselves to such themes as "On the Relation of the Communist Party and the Soviet State toward Religion and the Church," and "The Method of Scientific Atheistic Propaganda." Along with the seminars have come public denunciations of teachers who have been lax in propagandizing against religion or who have allowed evidences of religion to creep into their teaching practice.

The Soviet Union has not only secularized education by separating church and state, but has actively attempted to propagandize against the church. Since the education of the Soviet citizen continues through all the activities of his daily life, the rulers of the Soviet Union must constantly bring before their citizens the non-spiritual, wholly materialistic concept of life as viewed by the theoreticians of the Communist Party.

The state practices education by decree

Soviet education is restrictive. To instill conformity its basic approach is characterized by written decrees. "Discipline is regarded as a matter of State importance as well as parental concern in the USSR. At an early age Soviet children are taught conformity—a passive acceptance of personal and social discipline."[20] To insure conformity, younsters at the onset of school age are taught "Rules for Children," the decree alluded to earlier; the decree whose "Twenty Golden Rules" apply with equal vigor to the out-of-school behavior of children as well as to their in-school conduct.

Although much of Soviet education is characterized by the issuance of decrees, not all of these decrees *appear* restrictive to Soviet youth. Within the past several decades the Soviets have revived one of the Czar's most hated decrees—that dealing with the need for a passport to travel *within* Russia. It has been decreed that all Soviet young people must come under rigid passport regulations on their sixteenth birthday. But, to minimize the restrictive aspect of the decree, the Soviets have developed much pomp and ceremony attached to the issuance of this passport. An object once reviled and castigated by Lenin, the internal passport today symbolizes the arrival of maturity, and citizenship and has become, ironically enough, a symbol of Soviet freedom.

The curriculum developed for Soviet schools and the textbooks used are the results of decrees by the Central Committee of the Communist Party. The activities of the *Komsomol,* the Communist youth group, are the outgrowth of decrees. On each anniversary of the Soviet Union newspapers such as *Pravda* and *Izvestia* print scores of slogans to be used by various occupational groups to promote the celebration of the founding of the Soviet Union. The Soviet citizen is subjected to so many decrees for such a major portion of his life that when major shifts in Communist policies occur the issuance of a new decree generally suffices. The most

20. *Education in the USSR.* Bulletin 1957, Number 14, U. S. Department of Health, Education and Welfare, Office of Education, pp. 63-64.

dramatic example of this was the downgrading of Stalin during the Twentieth Communist Party Congress, in 1956. Stalin, for years eulogized along with Lenin, was now accused of the most heinous crimes against the Soviet people!! Such radical shifts in official attitude would not be possible were it not for an education which prepared citizens to accept decrees without question.

The state marshals its educational resources for the good of the state

A fourth method for implementing the aims of Communism and, perhaps, the most unique feature of Soviet education, is the insistence of the Communist Party that education serve the State. This has wide ramifications which ultimately are reflected in the total professional manpower supply. Contemporary Communism has as one of its purposes the overtaking of the Western World in the area of science and its dependent technologies. Since education is a political weapon and since it is a handmaiden of the State, the emphasis is not upon what education can do for the welfare of the individual but rather what the education of the individual can do for the welfare of the State.

Because of this one unique feature the Central Committee of the Communist Party has established certain priorities. High among these priorities has been the necessity of literally raising the Soviet Union by its own bootstraps to develop a science and a technology second to none in the world.[21] The Soviet educational system is geared to this purpose. The Soviet students rewarded for displaying an interest and an ability in the high-priority sciences; his education is free and his life as a student is subsidized. A student in higher education and in a critical scientific area gets paid from 290 rubles per month in his freshman year to 395 rubles per month as a fifth-year student with a bonus of 25% additional pay for excellent grades. His pay continues while on vacation and he gets a 30% discount on hotel rates while on vacation.[22]

However, once the Soviet student enters into a field of study he rarely, if ever, leaves that field of study. An overriding obligation for his free and subsidized education is his service to the State. The Soviet graduate's continued interest in the field for which he is prepared is of little concern to the Soviet Union. It has an investment in his education and his wishes, interests, and aspirations are subordinated to the immediate political, technological, and economic needs of the State.

What are the aims of an American free society?

As in the case of Communism when one attempts to undertake a discussion of the aims of a people, it soon becomes apparent that aims are dichotomous, the stated aims of a people are not always a true reflection of their real aims. Unlike the aims of Communism, however, the stated aims of an American society have been more closely reflected in the real aims of its people than anywhere else in the world. The most dramatic example of this in recent times has been the historic ruling on segregation made by the United States Supreme Court on May 14, 1954. Were the real aims of the American people vastly different from its stated aims such a decree could not have been handed down from

21. For an excellent evaluation of the status of Soviet science see Robert Wallace, "First Hard Facts on All Russian Sciences" *Life* 43:109-122 (December 16, 1957).
22. Mikhail Kruglyansky, "The College Student in the Soviet Union" *USSR*, No. 7.

the nation's highest tribunal.

The aims of a people, however, are not the basic building blocks of its society. For these, one must go back to the values held by its people. There have been many statements of the American value system over the past 175 years of the existence of the American nation, but perhaps none so succinctly stated as those appearing in George S. Counts' *Education and American Civilization*.[23] Counts identifies five values which typify the American value system: (1) the Judaic-Christian ethic, (2) the humanistic spirit, (3) science and the scientific method, (4) the rule of law and (5) the democratic faith.

The Judaic-Christian ethic

Our American society is founded upon the principle that proclaims, without qualification, the supreme worth and dignity of the human being. Every man is precious because he is unique, because he is himself and no other. It proclaims that "all institutions and social arrangements are to be evaluated, to be accepted or rejected to be preserved or modified, as they affect the lives of individual human beings." In the words of Jesus and of the Jewish prophets before him, "Even the Sabbath was made for man, and not man for the Sabbath."

Philosophers and some theologians might question Counts' humanistic interpretation of the Judaic-Christian ethic on the grounds that power resides not within man but within his God. However, even the Judaic-Christian ethic has its own dualism. Certainly, the non-fundamentalist approach to the teachings of the Jewish prophets and of Christ and his disciples adheres to the concept which is central to their belief that the power to do good or to do evil resides solely within man. This notion does not obviate the more fundamentalist conception of man's relation to the universe and would most certainly admit that there is a power higher than that which resides within man. The important notion here and one which most directly affects the American value system is that the power to do good or to do evil is man's.

Although Americans have successfully separated the church from the state in matters educational and political, the impact of the ethical teachings of the two major religions of American society have indeed made their mark upon the American value system.

The humanistic spirit

This value commitment views the powers that reside in man as the key determinants of his destiny. What man is today and what he may become tomorrow rest solely upon his own efforts and his own decisions. Because man is viewed as the fulcrum around which is built a society, society exists for man rather than man for society.

A concept such as this denies authoritarianism and rejects its brutal restrictions upon the movement of individuals. A society committed to a humanistic philosophy cannot accept dogmatism; it cannot accept restriction on learning of new knowledges nor can it deny to the individual the right to experiment with new ideas, and new modes of behavior. In the words of Counts:[24]

> [The humanistic spirit] knows no master except the ideal of truth, and it realizes that truth itself grows and

23. George S. Counts. *Education and American Civilization*. (New York: Bureau of Publications, Teachers College, Columbia University, 1952,) pp. 220-291.
24. *Ibid.*, p. 235.

changes both its substance and its contours with the advance of knowledge and thought. To it the burning of books, the closing of libraries, the putting of scientists in uniform, and the regimentation of the mind constitutes a degradation of the powers and a betrayal of the hopes of mankind.

Science and the scientific method

This value commitment declares a profound belief in the method of science as the only truly reliable method for obtaining knowledge about the world of nature and man that has ever been discovered or devised. It declares that truth is not static; that the search for truth is an on-going search. It accepts dogma only as an hypothesis to be tested through the scientific method. It does not allow either a philosophical or political commitment on the part of a society to render final man's concept of man nor his relationship to the universe.

The rule of law

The rule of law guarantees to the individual freedom of speech, press, and religious worship, freedom of political and civic assembly, freedom from arbitrary arrest, trial, and punishment. The rule of law does not proclaim a man guilty and then seek to force him into the Procustean bed of confession. This value commitment is a commitment adhered to verbally by totalitarian societies but yet perverted by these same societies through the means they employ to implement this ethic.

The democratic faith

This tenet affirms the worth of the *individual*—it regards political and civil liberty as the only dependable guardian of individual worth and equality. Our American value system rests on law and orderly process, on democratic morality, on individual opportunity and individual responsibility. A faith in democracy is a faith in individuality and is a concept central to the American value system; it declares boldly that the ultimate good of a society rests solely in the assurance that the individual is given every opportunty to realize *his* potentialities, and to fulfill his own desires. The vast resources of a state are readily marshalled to help the individual realize *his* goals rather than marshalling the individual's potentialities to meet the goals of the *state*.

Means employed to implement the American value system

The American educational system is unique in several ways: (1) it emphasizes freedom of choice on the part of the individual, (2) it presents a balanced curriculum from the kindergarten through the baccalaureate degree, (3) it minimizes artificial standards and makes possible educational *opportunity* for all, (4) it emphasizes learning through participation, (5) it makes the individual the focal point for all educational activities, and (6) it places the responsibility for the education of the young completely in the hands of local and state agencies.

Freedom of choice on the part of the individual

One of the identifying characteristics of a citizen in a free society is his ability to make *intelligent* choices. This ability cannot be acquired automatically when an individual reaches maturity, but must be nurtured early in his life. The American child is given an opportunity to make choices—and to make mistakes in his choices—from the time he enters the

kindergarten. He is taught the skill of making decisions in many ways. He helps his teacher and his classmates plan a portion of the school activities in which he will engage; he takes part in student government; he is taught to work within a group; he is taught the skill of making decisions within a group, as well as reaching individual decisions.

As the student grows older and matures, he is encouraged to use his formal education to determine his future occupational status. With the help of skilled counselors the student selects courses in high school that will help prepare him for college or for a successful, rich life should he choose to terminate his formal education after completing the secondary school. The choices he makes are important to him and must be made intelligently. To help him make his decisions with some degree of intelligence trained guidance workers administer tests that will give the student a picture of his academic abilities, his intellectual potential, his occupational preferences and aptitudes and an over-all picture of his basic personality. With these assists the student learns to determine his own destiny.

A balanced program from the kindergarten through the baccalaureate

Another distinguishing characteristic of American educational method is the concept of a balanced curriculum; a balance between the humanities on the one hand, and the sciences on the other.

Science and mathematics have played a basic role in bringing man from ill-clothed, ill-fed savagery to the high level of living of contemporary western civilization. The technological developments of the past centuries have most assuredly helped man to free himself from the controls of his physical environment and even promise in the future to help man control the weather, harness the energy of the sun, make the ocean the chief source of power, and to free himself from the very planet that spawned him. It becomes increasingly evident that if man is to survive in a free society he must be able to reach out to the stars through a mastery of the secrets of the universe; it is equally evident that he must first control himself. Charles E. Odegaard, recently made explicit the purposes of the social sciences:

> We need to know and understand the spiritual and moral requirements demanded of each of us in our relations with our fellow citizens and with other nationals, if we are to preserve free and liberal institutions . . . This is the business of the humanities and the social sciences . . . the arts too have their place in aiding us in the search of self-revelation. They are not a mere luxury for idle moments but a level of discourse which is an integral part of man's conversation with himself when he strives to see himself whole as a thinking and feeling creature.[25]

From the time the American student enters the kindergarten of the American public school he experiences a program designed to help him understand himself, his fellow man, and his relationship to the universe. American education has been dedicated to the idea that through a wide variety of experiences the individual will find his own fulfillment. The individual's interests are not shaped to meet the exigencies of the day but are given free rein to develop as his own abilities and desires dictate. At each succeeding level of education the youngster is encouraged to develop an area of

25. Charles E. Odegaard, "Toward the Conquest of Fear." Report to the American Council of Learned Societies. (Washington, D. C.: The Council, January, 1951) pp. 5-6.

specialization. Through his twelve years of public education the student proceeds from a general education to one more specific. Even at the undergraduate level of the university the student's first years are devoted to acquiring a broad outlook on life. As he proceeds to advanced work, the student places greatest emphasis upon an area of specialization and less upon education of a more general nature, though continuance of his formal education in the humanities is encouraged even through the doctorate.

Educational opportunity for all citizens

A superficial analysis of educational opportunity in many countries would lead one to believe that the principle of universal education is widespread. Upon closer examination, however, one finds that in many cases universal education becomes universal education *for those who can qualify,* and those who can qualify are those who have been able to stand the rigors of state-controlled examinations. In many countries where universal education is claimed students take formal examinations at age ten or eleven; examinations that determine early their occupational future in a very real sense their future social status. Moreover, not all successful graduates of the secondary schools can go on to institutions of higher learning even though they are qualified and have a desire to do so, for if classroom space is not available, many nations, including the Soviet Union, control the minimum score on entrance examinations to fit the number of classroom openings.

In the United States arbitrary manipulation of test results and other artificial standards are minimized to allow those desiring further education an opportunity to continue their formal schooling. This is not to imply that academic standards are not present in American education. The elimination rate at the university level at the end of the senior year is as high as forty percent of those who started as freshmen. The standards employed by American institutions of higher learning are based upon the student's performance over an extended period of time rather than the result of a single test situation. This has proved to be a more expensive alternative but Americans are committed to the value which stresses the opportunity of the individual to develop his interests and his native endowments to the fullest.

Periodically, in every state legislature in the United States, presidents of state-supported institutions appear before legislative committees to plead for funds necessary to accommodate increased enrollments in their colleges. The basic assumption in these fiscal discussions is that students will not be turned away from educational institutions because of lack of classrooms and laboratories; that *all* who have completed the requisite preliminary formal education shall have the *opportunity* to continue. This is the unique difference between American universal education and universal education in other countries.

Emphasis upon learning through participation

It has become axiomatic in American public education to think of learning experiences as being active ones. As Whitehead points out, the conception of learning that dictates that "Students should learn passively, and then having learned, should apply knowledge" is a psychological error.

> . . . The applications are part of the the knowledge. For the very meaning of the things known is wrapped up in their relationships beyond

themselves. This unapplied knowledge is knowledge shorn of its meaning . . . Celibracy does not suit (an education). It must mate itself with action.[26]

The student in attendance in American public schools today participates actively in a number of different ways; he helps to plan the work in which he will be involved; he is encouraged to discuss and to question the things he reads, and the statements he hears; he is encouraged to use as authority his own verification of concepts, ideologies, results of experimentation and the like. Obviously not all things can be or need to be verified by the student before they become truth but the student is encouraged to look on those things which he cannot immediately verify as subject to change.

The American student learns his democratic values by being encouraged to participate democratically in many of the learning activities of the school. He is encouraged to participate in community activities suitable to his own age group, *e.g.*, Boy Scouts, clubs, fund-raising activities, church related activities, and the like.

At the heart of this characteristic of American education lies a commitment to the problem-solving method. Subject matter is studied as a means of solving problems rather than as an end in itself. By placing learning in an activity-centered context, knowledge then becomes instrumental in learning new knowledge and the entire process of learning becomes a dynamic one.

The individual as the focal point for all educational activities

The concept central to the American value system proclaims that opportunity for indivdual achievement and satisfaction must take precedence over any other purpose of education. It does not adhere to the notion of subjugating the individual's aspirations for the good of the state, for the individual in a democratic society—his abilities, his aspirations, his mode of behavior—is viewed as the prime factor in what a society itself becomes.

The entire educational enterprise from the kindergarten through the university is organized to fulfill this basic purpose. As early as the junior high school years students are given an opportunity to make choices between courses offered in the curriculum. The elective system has developed in the American school because it has been recognized that education is for the individual and not the individual for education.

The prominent theories of contemorary education stress the interests of children as basic to the learning process. Psychological learning theory emphasizes the goal-seeking behavior of man, the necessity of the individual possessing a level of aspiration to which he may direct his energies. Studies in learning have long indicated the effectiveness of internalized goals upon the ultimate level of achievement of the individual. "Complacent persons learn very little. . . . It is when their energies converge upon well-defined and attainable goals that improvement takes place."[27]

Another dimension of the concept that stresses the role of the individual as the focus for educational activities is that of creativity. Creativity is an individual phenomenon.

26. Alfred N. Whitehead, "Harvard: The Future," *Atlantic Monthly*, 158:267, (September, 1936).

27. Arthur I. Gates, et al., *Educational Psychology* (Third Edition) (New York: Macmillan Company, 1949), pp. 305-306.

> What is important about education creativity is that it helps children, youth and adults to make the most of themselves. Indeed, we seek a creative education not to produce artists, but to grow better men and women; for we hold that only through an education that furthers creativity can we give every individual an opportunity for fullest self-realization and simultaneously equip every individual for the maximum of service to his fellow men.
>
> Finally it is in furthering creativity that freedom and democracy have their greatest promise for mankind. To be sure, political freedom . . . economic freedom . . . social freedom exercises a benficial and enobling influence on humanity. But man's freedom to become all he is capable of becoming in the creative sense is the ultimate flower of a free society.[28]

Thus, the curriculum is designed to offer a wide variety of experiences through which the student can fulfill his own aspiration and the methodology employed in the instruction of youth emphasizes the importance of keeping the individual as the focal point of the instructional program. In essence, all of the educational resources of the nation are marshaled to help the individual become what he most desires to be.

The local community assumes responsibility for the education of the young

As early as 1647 the General Court of Massachusetts ruled that local communities support schools for their children. In the three hundred and ten years since the founding of compulsory education in the colony of Massachusetts, Americans have been jealous of their traditional prerogative to maintain and control the policies of their own schools. So strong is the feeling for local control of the public schools that even in times of dire national emergency —even with the threat of utter annihilation by Soviet intercontinental ballistic missiles—some American educators and some of the American people refuse to accept federal fiscal aid for fear of losing their control over the destinies of their local schools.

The economics of the contemporary scene demands supplementary fiscal aid from federal funds for the adequate maintenance and development of American public schools, yet widespread jealousy of local autonomy has prevented the development of stronger public schools. That the aim of local autonomy is exemplary cannot be seriously questioned. Unfortunately, proponents of federal aid to education have been unsuccessful in communicating the ability of the federal government to supply fiscal aid to public schools without demanding control of local educational policy.

Actually, the United States is unique among its world neighbors because it has no national ministry of education. Recently a new cabinet post, the Department of Health, Education and Welfare, was created which has as one of its functions a concern for American education. For several decades the United States has maintained an Office of Education but never has the Office of Education or the Department of Health Education and Welfare sought to develop a national curriculum or any national standards to which all schools must comply. Education on the national level in the United States has always been considered a service function of the federal government but never a legislative one.

28. Ernest O. Melby, "Education for Creativity" *Michigan State University College of Education Quarterly*. East Lansing, Michigan: Winter, 1957, pp. 7, 18.

This insistence on the part of the American people for local control of the schools merely reflects values identified earlier. As we review the values held by the American people—their belief in ethical conduct, in the importance of the human being, in the scientific approach to the solution of problems, in the inherent belief in law, and in the ultimate worth of the individual—the means employed to implement these aims are consistent with the aims themselves. For that matter, the means employed by the Soviets to realize their basic aims are consistent with the aims of their society. The question which needs to be considered at this point is the appropriateness of employing Soviet means to achieve American aims.

(To be continued next month)

BOOK REVIEWS

READ FASTER—AND GET MORE FROM READING. By Nila Banton Smith. Prentice-Hall. 1958. 387 pp. $5.95.

Due to the complexities of life in today's fast-moving world, there has arisen in the adult American a deeply-felt need to read faster and better. Dr. Nila Banton Smith's book, "Read Faster—and Get More From Your Reading" is a "do-it-yourself" book, geared to meet one's personal need for fast, retentive reading, whether this need be for advancement in a business, professional or academic career, or for pleasurable reading in one's leisure time. It is also designed for use as a basic text in reading improvement courses for adults.

The basic techniques in the art of rapid, effective reading are presented in a step-by-step sequence. The author introduces each chapter with anecdotes or explanations which set the frame of reference for the technique to be developed. Each reader begins with a self inventory, and by following the instructions and practicing their applications conscientiously he can achieve whatever goals in reading efficiency he may desire.

The chapter headings are eye-catching, and the topics are introduced so that the reader may relate them to his personal experiences. For example, "Shop Before You Read" introduces the reading techniques necessary for previewing an article or book.

Speed in reading is not emphasized for its own sake, but is always related to comprehension, and to the purposes for which one is reading. The various chapters include vocabulary lists, self-testing, timing and scoring devices and comprehension questions and answers. The reader is alerted to recognize the important words that signal a change in pace or thought, and the "hidden persuasion" or "loaded" words used in propaganda. Much practice is given in skimming, scanning and selecting essential facts from a mass of material.

There are two unusual chapters in this book. One deals with the reading of common legal documents, such as leases, insurance policies etc.; the other is directed to heads of business firms concerning the values to be derived from and procedures to use in installing a reading improvement program in their own offices and the differentiated courses which they may use for training executives or employees who do different types of reading.

This book fulfills the basic purpose for which it was written—to help a person to read as well as he wants to read. The clear type, the human, informal introductions to the chapters, the abundance of practice material, the timing and scoring devices, and the encouraging and the understanding viewpoint of the author, all serve to make this book essential to those adults who wish to read faster, with greater efficiency and understanding.

—Anna S. Harris
Reading Specialist
Minnie S. Graham School
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A Look at Drill

GARRY CLEVELAND MYERS
Editor, Highlights for Children
Honesdale, Pennsylvania

THE word *drill* has almost disappeared from educational literature, except by way of condemnation. Some teachers suppose it is something "sinful."

The chief reason, perhaps, why drill has come into disrepute is that it usually has meant mere repetition, therefore repetition of the wrongs along with the rights. Have a whole classroom of third or fourth grade pupils drill in the usual way on the basic addition and subtraction combinations; written or oral testing of the children on these and many of these children will give incorrect responses over and over again. Apparently they repeat the wrongs as often as the rights.

The teacher assumes that the wrongs will drop out and the rights grow stronger; that the wrongs will soon be on the scaffold and the rights upon the throne. But the wrongs keep wearing crowns together with the rights. Repetition of incorrect associations tend to help fix them in the child's memory as surely as repetition of the correct associations help to fix them.

The same may happen when children are drilled together on column addition or simple subtraction; or when there is similar drill on spelling lists of words. It even may happen when individual children are set to do over and over similar work.

A widely prevalent practice is to have no child study the correct spelling of a word until he has spelled it wrong, and often many times wrong. There are conflicting results on investigations of pretest spelling. I know of none in which the stage was set so the non-pre-tested group were carefully guided in avoiding repetition of wrong spelling. More careful studies with scientific rigor are needed in this field; in various fields of drill, indeed.

I propose a definition of effective drill —repetition of what has already been learned correctly—overlearning. Children don't mind doing again and again what they know they can do with precision. They may like it. All the talk about drill being dull and boresome presupposes drill to be mere repetition and repetition of wrongs as well as rights.

There's very little place in elementary practice for teaching the child to go over and over correctly an essential fact he will need for the rest of his life, like 9 and 8 are 17, or b-u-s-y spells busy. Usually he is tested over and over on such before he has mastered them. Where does he get practice at learning such items alone? Where does he acqire self-reliance at such learning?

Most, if not all, workbooks in spelling don't have the pupil repeat the correct spelling of a word often enough, as a rule, to master it even for the moment, let alone for permanent use. Even in high school, if he studies chemistry, he will need to learn some symbols in connection with their meaning. And he

hardly will master them without frequent repetition, without learning them by heart.

If, later, he enters dentistry or medicine, he won't get far in certain courses like anatomy without a lot of good old-fashioned "boning."

If, instead, he enters a graduate school of education, he may pursue courses in which drill and memorizing are derided. But unless he does some "boning" on a few essential items of the course before his examinations come, he may not pass!

Whether the pupil in the middle or upper grades studies the spelling of assigned lists of words or those he lists himself, he will need to practice the correct spelling of each word right before him as he carefully names the letters in right order over and over till he has completely mastered its spelling. And with few exceptions, he also needs to practice still more in the spelling of this word in a meaningful setting, or as a separate word in order to retain its correct spelling.

Often, however, conflicting principles operate. If we held literally to the aim of helping a child as far as possible never to spell a word wrong, we could not easily encourage him in creative writing.

Some teachers wisely induce children to put down their ideas on paper, not worrying about spelling, punctuation or capitalization. Thus their creative expression may be unhampered to this degree. These teachers then evaluate the creation, regardless of its spelling and the like.

But they don't stop here, as a rule, they go back then or later with the child to help him have practice at correct repetition on the spelling and other essential items.

BOOK REVIEWS

SCHOOLHOUSE. Edited by Walter McQuade. N. Y. Simon and Schuster. 1958. $10.00.

Schoolhouse came into being through the efforts and foresight of the Aluminum Company of America. Three years ago, this company enlisted the aid of a group of architects and engineers and set them to work on the problems involved in putting up schools. The result is this book of fine photographs and detailed text. The volume deals with such matters as structure, design, plumbing and heating, ventilation, as well as such preliminary problems of bond issues and the like. The appearance of the book is quite timely because our citizens are torn between the desire to construct the best schools for their children and the desire to keep taxes low. The volume will be an invaluable guide for school board members, architects, and contractors. School administrators and parents—not to forget teachers—will also want to study its designs and plans.—W. P. S.

PSYCHOPATHIC PERSONALITY AND NEUROSIS. By A. A. A. Terruwe, M. D. Translated by Conrad W. Baars, M. D. N. Y. Kenedy. 1958. $3.50.

Dr. Terruwe is a specialist in neurology and psychiatry. She studied medicine at Utrecht and completed her studies at Leiden. At present she is a practicing psychiatrist at Nijmegen, Holland. In this book, the first of her volumes to be translated into English, she ascribes many neurotic disorders to faulty religious training. The entire work is based on orthodox Thomistic philosophy and, consequently, does not draw on the contemporary schools and research in psychology.

—W. P. S.

LEADERS IN EDUCATION XIII

DR. FREDERICK H. LUND

The One Who Brought Understanding to the Problems of the Emotions

FREDERICK H. LUND—psychologist, author, educator—derived much of his passion for meeting squarely the emotional problems of men from his father Hans H. Lund who, as a young Lutheran zealot, took his bride Johanne (nee Holl) and emigrated to New Zealand, where son Frederick was born on April 4, 1894. Hans was a man of great spirit and immense personal conviction, who sought to expand the influence of his church into the lives of his fellow countrymen, the European pioneers of New Zealand.

When, in 1909, he brought his family back to Taulov, Denmark, where most of his relatives still reside, Fred was trained to be a brick-layer. But the young Fred's yen for meeting the greater issues of the human spirit could not be satisfied in the relative security and routine life as a brick mason in Denmark. So in 1914 he emigrated to the U. S.

Even in growing America, although busy at his trade, he did not find the challenge his spirit demanded until he entered college and, in 1921 was graduated, with a B.A. degree and Phi Beta Kappa honors, from the University of Nebraska. This turned the skilled craftsman into a scientist and scholar.

While Dr. Lund is nobody's disciple, there were other individuals than his father, who strongly influenced him. He first became intrigued with the ideas of William James through his philosophical studies continued at Nebraska, where he earned his Master's degree in 1923. Since James had come to psychology with a strong biological background, Dr. Lund was impressed with his assertion that the future of psychology lay in the observation of the mind through its manifestations in the body. But the idea of man's functioning as a biological unit was brought to maturity in the young student's mind through the research of Walter B. Cannon, whose work he came to know intimately as a student at Columbia University, where he received his Ph. D. degree in 1925.

He rejected the more restrictive position of John B. Watson and resisted the influence of Freud because psycho-analysis seemed to ignore some of the essential characteristics of the human organism.

Dr. Lund taught at Columbia (1923-27), at Bucknell (1927-30), and finally (1931) became Professor of Psychology at Temple University, where he is still active. For the past eleven years he has served as a part-time psychological consultant to the Camden Public School Clinic, so as not to lose contact with the realities of psychological practice.

In 1931 he was also made a member of the graduate council at Temple, was included (1934) in "Who's Who in America" and conducted a research project (1935-39) for the American Council on Education on "Emotions and the Educative Processes."

In 1927 he published his first book, "Psychology, the science of Mental Activity" (A. G. Seiler, N. Y.) which went into two printings. His "Emotions of Men," published (McGraw Hill, N. Y.) in 1930, brought him immediate recognition in the field of emotions. His "Psychology, an Empirical Study of Behavior," published in 1933, (The Ronald Press, N. Y.) and his "Emotions, an Experimental Physiological Study," published in 1938 (The Ronald Press, N. Y.) firmly established his reputation as a leading authority on emotions.

His journal publications, of which there have been thirty or more, have further established his status as a research worker. The thread of his life is seen running through such titles as "The Emotional and Volitional Determinants of Belief" (1925), "Why Do We Weep?" (1930), "Educational Research in the Field of Emotion" (1931), "Adolescent Motivation—Sex Differences" (1944), "The Internal Environment: Its Relations to Problems of Activation and School Adjustment" (1948), "The Nature of Mental Illness" (1957), and "Biodynamics vs. Freudian Psychodynamics" (1957).

Dr. Lund is now on leave of absence from his duties as Professor of Psychology at Temple University, in order to carry out a special commission to explore and report on "The Recent 'Break-through' in Bio-Chemistry and Its Implications for Psychology and Education."

Always a scientist, he has never pursued the insights gained through his devotion to obective research to conclusions unjustified by the data. He has thus avoided the cynical pitfalls of those of lesser astuteness who, unable to wait for insight, have either fled into the speculations of philosophy and metaphysics or have wailed that "man is only a mass of protoplasm pushed about by time."

A former student of his recently remarked, "Dr. Lund is not only a professor who delivers his lectures but a truly great teacher who teaches his students."

What the Schools are Doing in Providing Learning Activities

GUY WAGNER
Iowa State Teachers College, Cedar Falls

Variety's the very spice of life.

—Cowper

THERE was a time when pupils devoted nearly all of their school day to: (1) *reading* from the same page assignment, (2) *reciting*, with teacher questions based upon the single textbook assignment, and (3) *writing* on class assigned topics. "Schooling" took place within the school walls and was largely of a verbal nature. Field trips were few, if any; audio-visual education encompassed only blackboard work and a few flat pictures; experimentation was extremely limited; constructional activities were chiefly making the same tie rack, etc., in the high school "manual training" class; and creative writing was often done surreptitiously behind the covers of that big geography textbook. In many schools, library facilities were so limited that substantial research readding was impossible even though the teacher might have found the time and the imagination to plan for it.

It is interesting to note the variety of activities suggested in present-day curriculum guides. These activities are thought of as resource ideas from which the teacher may choose in helping children *to help themselves* in learning about the problem at hand; they are to be selected according to their usefullness in contributing to a given learning goal. In good schools the "bread-and-butter" activities such as research reading, observation, discussion, experimentation and writing continue to fill the major part of the pupil's school day. It must be recognized, however, that the value of different teaching techniques vary—some methods may be suited to one type of learning experience but not to another. Thus, a relatively minor technique may be just the right choice in a given situation.

It should be recognized, too, that some children may not have the necessary background to use certain techniques successfully. For example, immature children might flounder helplessly if put too abruptly into a "buzz session." They would surely be extremely bored and restless if subjected to a half-hour formal lecture. The strong teacher, although he may have certain methods as his forte, nevertheless has a wide repertoire of teaching techniques and devices on which he may call in order to have his teaching match the present situation.

The importance of teachers having a wide range of techniques and materials is paralleled in other fields of endeavor such as medicine, farming, engineering,

and law. For example, the competent doctor has a variety of medicines and treatments with which he is thoroughly familiar. His treatment, however, may vary with individuals. The important thing for him is to know the whole range of possible treatments and choose the one or the combination most effective for the case at hand.

As a possible guide to a more complete, versatile, and wisely-used program of learning experiences, representative activities as found in current curriculum guides are classified here according to categorical types.[1] The first four activities in each of these categories are briefly explained.

CONSTRUCTIONAL ACTIVITIES

1. *Models:* By careful research, data can be gathered for making reasonably accurate miniatures of the past such as ancient buildings and prehistoric animals; also striking characteristics of present-day life such as skyscrapers, jet planes, and super highways.

2. *Things that Work:* Make a simple telephone by use of tin cans; a toy motor; a bottle xylophone; a wind sock (wind cone) to point the right direction of the wind; etc.

3. *Replicas of Nature:*[2] Make an aquarium, a terrarium, an anterium, a vivarium, a sand table scene of woodland life, desert life, etc.

4. *Relief Maps and Globes:* Using such materials as paper maché, children may develop better understanding of terrain by making simple relief maps and globes.

5. *Others:* Puppet stage and puppets, various types of maps and globes, three-dimensional projects, dioramas, mock-ups, cutaways, costumes, stage props, pupil-made graphic materials, facsimiles, etc.

DISCOVERY AND RESEARCH (Finding Information)

1. *Experimentation:* With problems and apparatus geared to pupils' achievement levels. Pupils need many opportunities to discover "the facts" by experimentation.

2. *Field Trips:* The degree of teacher-pupil planning necessary depends on the age and "trip experiences" of the pupils.

3. *Study Questions:* Either teacher or pupil prepared; used to direct pupils' search for pertinent information.

4. *Reading Assignments:* The assignment of certain reading references for either class discussion purposes or for class reports remains a very acceptable teaching technique. The questionable procedure is to use the group textbook assignment as an exclusive pattern with the pupils required to "re-cite" daily on the material. For those who have read the assignment with understanding this is merely an exercise in boring repetition.

5. *Others:* Interviews, letters of inquiry, telephone calls, questionnaires, surveys, supervised study, individual conferences, analyzing data, observations (often searching for illustrations of ideas being studied), stereographs, utilizing the senses of touch, taste, smell, hearing, and vision in a variety of ways—also the kinesthetic or muscle sense. Many teachers are now having individual pupils study filmstrips in a "viewer" as a means of finding information related to personal projects.

DISPLAY

1. *Graphic Materials:* Such as diagrams, charts, and graphs, either commercially prepared or pupil constructed, sketches and posters.

2. *Realia:* The *real thing* gives meaning to the subject being studied. This real thing may be an artifact, represented by an Indian Arrowhead; a

1. It is recognized that other equally valid classifications could be made. The purpose here is to group activities of a relatively similar nature so that teachers may more readily sense if their pupils are provided a reasonable balance in types of experiences. In many instances individual activities may be expected to fit into more than one category.

2. See *Nature Study Equipment, How to Make and Use It,* by Pauline L. Sauer, Educational Service Publication, Iowa State Teachers College, Cedar Falls, 1955. 25¢

relic, such as great-grandfather's Civil War musket; a present-day souvenir of fourth grade Billy's recent trip with his parents to old Mexico; or a discarded motor, still useful in a study of the electromagnet.

3. *Bulletin Boards:* Displaying in attractive form pictures, charts, and three dimensional portrayals related to a current class study.

4. *Specimen Boxes:* One primary-grade teacher prepared small boxes of such specimens as (1) grains, (2) types of cloth, and (3) kinds of nails. Commercial specimen boxes are also available, for instance, *The Specimen Box of Pebbles,* Chicago Natural History Museum, Cost $1.25.

5. *Others:* Collections, chalkboard, flannel and felt boards, sand table, science fairs, table scenes, showcase displays.

GAME ACTIVITIES

1. *Self-competition:* Probably the the best single illustration of this type of game is the card game called *Solitaire.* Here, winning depends wholly on one's own efforts. In terms of school instructional games, a good example would be a spelling game in which a child tried to beat his own past record.

2. *Partnership:* There are literally hundreds of ways in which two youngsters may compete quietly with each other in a game situation. One of the best known is checkers another is chess. In terms of school instructional games, the children could play variations of vocabulary games using flash cards.

3. *Active Group:* Active group games are plentiful—both for outdoor and indoor use. Teachers might especially want to investigate instructional games that teach as they give pleasure and afford moderate physical activity within the classroom.

4. *Quiet Group:* A search through courses of study in curriculum areas such as reading, arithmetic and the social studies reveals a wealth of instructional games. Actually many of these games are merely good teaching techniques that are given added motivation by capitalizing on the "game" element. There are such intriguing titles as *Backward Listening, Circle Throw, Race Track, Read My Mind, Taste Detective,* and *Hot Potato.*

5. *Others:* There are many ways in which game activities could be classified, for instance, they might be classified according to subject areas: arithmetic games, spelling games, etc. It seems, however, as though the four above classifications encompass all types of games. As an added observation, it should be noted that there are a number of commercial games that have instructional value for school and home use.[3]

IDEA EXCHANGE

1. *Group Discusssion:* At the primary-grade level, group discussions will often need to be sparked with well-prepared teacher questions. As children develop skill in discussing problems there should be more emphasis upon responsible pupil leadership.

2. *Buzz Sessions:* Occasionally during a group discussion it may be advisable to have children organize into several small discussion groups. Here even the shy child will participate and there is more opportunity for everyone to express an opinion. When the class reconvenes as a single group the smaller buzz session groups will share their findings and discussions.

3. *Committee Meetings:* During the year pupils should serve on a variety of committees to obtain a balance of experiences. All pupils do not need to be on a committee at the same time.

4. *Planning Sessions:* Often at the beginning of the day, elementary school teachers have a planning session in which plans for the entire day are reviewed. This in no way means marked deviations from the daily schedule—it does mean, however, that the children will be freshly oriented to the daily work. Other occasions during the day

3. Upon request, an annotated list of 40 commercial games may be obtained from the Curriculum Laboratory, Iowa State Teachers College, Cedar Falls.

often suggest planning periods either for small groups or the entire class.

5. *Others:* Individual conferences, question-answer, cut-off story, psychodrama, an open question period, coach and pupil (where one child coaches for a while, and then becomes the pupil while the other serves as coach).

WRITING EXPERIENCES

1. *Stories:* Original stories may be triggered by ideas developed in nearly any class—on the other hand the techniques of creative writing will need to be presented systematically during the language arts periods.

2. *Poems:* The writing of poetry fosters creative thinking and teaches children to present original ideas and personal observations in succinct ways, often using simple though colorful expressions.

3. *Editorials:* Valuable in teaching children to have well-thought-out opinions and the courage to express their convictions in an open-handed way.

4. *Radio or TV Scripts:* Particularly in the fields of science, language arts, and the social studies, there are many opportunities for the writing of mock radio or TV scripts—and in some instances the writing of scripts for actual presentation on a local radio or TV station. These scripts are likely to give added impetus to the units currently in progress.

5. *Others:* Slogans, riddles, plays, notetaking (of both talks and reading matter), class newspaper, letters to the editor.

ORAL PRESENTATIONS

1. *Lectures:* Particularly at the high school level, teachers often prepare well-organized lectures dealing with the topic currently being studied. At the elementary school level these lectures are more likely to be short, informal presentations by the teacher. There is much to be said in favor of the lecture technique when it serves to either interpret or elaborate upon the assigned readings. Often these lectures are enhanced by illustrations. Especially for younger children it is valuable to pause occasionally for questions and/or comments.

2. *Individual Reports:* In pupil reports there is a good opportunity to individualize the difficulty level of the work, while at the same time each pupil will have something different as well as important to present to the class. Through skillful teacher guidance each pupil reporting will have his presentation clearly in mind. It is extremely important that the listeners focus attention on the "message" rather than on the form of presentation.

3. *Team Reports:* A useful variation in the technique of pupil reports is to have two or more pupils serve as a team in reporting to the class. They may report on various phases of a topic, or one pupil may be the questioner with the other pupils giving the answers. This technique affords both variety and important emphases, thus promoting attentive listening.

4. *Verbal Illustrations:* The good teacher frequently clarifies an idea by the use of an anecdote, a story, a joke that helps make the point. Often, through these verbal illustrations, the pupil will get a "picture in the mind."

5. *Others:* Debate, panel discussion, interpretive reading, reading to quote pertinent information, symposium, resource visitors, radio transcriptions, phonograph records, tape recordings, disc recordings, floor talks, choral speaking.

ORGANIZATIONAL PROCEDURES

1. *Tests:* One particular value of the essay-type examination is that it compels the pupil to organize his ideas. For this reason the essay-test answers, if carefully evaluated by the teacher, will serve not only as a measurement of achievement but as a valuable teaching device. To some degree, the well-made objective test may also help pupils sense the organization of ideas.

2. *Notebooks:* When pupils can be made to see the importance of well-organized notebooks, they have an effec-

tive tool for patterning their information and recording it in appropriate and readable classifications. The high school student who carefully develops a physics or history notebook and the elementary pupil who prepares a personal notebook of science ideas or literary collections, have a tangible motivation to do their work with greater thoroughness and a higher degree of personal interest.

3. *Card Files:* One geometry teacher had each of his pupils develop a *toolbox* (card file) in which they kept important definitions and other pertinent information. In an English class some of the pupils made card files of difficult words which they had "conquered," quotations of outstanding "gems" from their readings, and briefly stated highlights of the stories read.

4. *Vertical File:*[4] With the wealth of current materials now available in the form of pamphlets, posters, pictures, clippings, and tearsheets, the vertical file is nearly essential equipment for the classroom. As pupils help develop this file they automatically increase in organizational ability. Because such a file is organized on the basis of "family groupings" the pupils soon learn *how* to file, as well as *where* to get the information related to their present studies.

5. *Others:* Outlines, summaries, teacher-pupil planning, scrapbooks, planning school events, preparing reports.

PRACTICE AND DRILL

1. *Listening Activities:* Blind-folded pupils listened intently as a ball was bounced—first three times and after a pause, four times. They then added the two series of counts to find the total number of bounces. There are many other ways in which skills in reading, spelling, arithmetic and the like can be given motivated practice through listening activities.

2. *Tape Recordings:* One of the best ways of helping an individual analyze his speech habits is to have him record on tape. Here he can be guided to note his strong points and weak points. Through systematic use of the tape recorder he can *actually hear* the improvement which he makes in such areas as articulation, pronunciation, rate, and voice quality.

3. *Vocabulary Drill:* Flash card drill on words is still an acceptable technique for use with younger pupils and with some slow learners in the intermediate grades. There are, however, more dynamic types of vocabulary drill such as those found in a number of instructional games. Another good vocabulary drill is the one where pupils fill in blank spaces in a story by use of context clues.

4. *Spelling Drill:* This, of course, is another form of vocabulary drill but it is mentioned because repetition in spelling is so important. When children write a word correctly they are learning both through the visual and the kinesthetic senses. The oral spelling drill, properly used with equated groups, also has merit. Here the children have practice in both saying and hearing the spelling of a word.

5. *Others:* Worksheets, workbooks, the practice of *manual skills* such as typewriting and handwriting, and *craft techniques* such as the use of tools and machines.

PROJECTED MATERIALS

1. *Lantern Slides:* Particularly at the primary-grade levels the pupil-made lantern slide (3¼" x 4" glass slide) has much to commend it. This slide can be projected in either a stereopticon or an overhead projector. Many kinds of slides can be made: maps, illustrations of characters in literature, arithmetic problems, outlines, etc. For various techniques and materials, obtain information from the Keystone View Company, Meadville, Pennsylvania.

2. *Opaque Projections* There is a wealth of instructional material immediately available to nearly any teacher for projection on the screen by means of

4. See "Don't Overlook the Classroom Vertical File" by Guy Wagner. *Education*, Vol. 78, No. 1, September, 1957.

the opaque projector. Some of these are graphic materials from books, pupil drawings, pictures from the vertical file, objects such as leaves and coins—all of these can be much more easily viewed by the total class when magnified on the screen.

3. *Films:* One of the largest film producing companies has already made about a thousand films for schoolroom use. These films range through virtually every subject field and are available for use at all grade levels. Today more and more teachers are taking advantage of the contribution which properly-chosen instructional films give to learning.

4. *Filmstrips:* Because filmstrips are relatively inexpensive and permit opportunities for thoughtful discussion as the sequence of pictures progresses, schools are increasingly building fairly extensive filmstrip libraries. Often children themselves will select a filmstrip for use in supplementing an oral report on a topic.

5. *Others:* 2 x 2 slides, overhead projection, television, stereoslides.

STAGE-TYPE PRESENTATIONS

1. *Socio-drama:* The socio-drama is particularly useful in helping children analyze a problem which involves a group of people. The essential of this technique is that children assume the role of another person in "acting out" a problem situation. In so doing they become intimately related to the problem rather than merely looking at it from the outside. Often they will take the place of a person who has an opposite conviction, which helps them to see the other's point-of-view.

2. *Informal Dramatizations:* There has been a marked movement away from children memorizing commercially-written plays, with the replacement being the informal dramatization. Here the children develop a general notion of the sequence of events in the story and then "ad lib" their way through the presentation. If the dramatization is to be used for other than classroom purpose they memorize their lines and develop a more finished product. Even here, however, they are not merely parrots for they themselves planned the drama.

3. *Assembly Programs:* Assembly programs today are, in large part, reflections of classroom activities which hold interest for the other children in the school. Here we are likely to find a first-grade group presenting their version of Cinderella, a third-grade giving a choral reading, and two boys in the fifth grade explaining how they made an electric map.

4. *Demonstrations:* Demonstrations are classified as stage-type presentations because the demonstrator normally presents something which might well be done from a platform. It may be a demonstration of a science experiment, or how to operate a motion picture projector, or the way to properly use a telephone.

5. *Others:* Plays, skits, pageants, pantomines.

EVALUATIVE TECHNIQUES

1. *Objective Tests:* These include questions that seek answers which are definite and final, therefore, each item is keyed to only one correct answer. Often objective tests seek only simple recall, using the *who, what, where,* and *when* type of question. Properly prepared, however, the objective test may be highly thought-provoking. This is especially true in the well-made multiple choice test. Here, the pupil often is asked to choose the best answer to a "situation," or to *how* and *why* questions.

2. *Thought Questions:* These are questions that are expected to draw forth a great deal of discussion and varying opinions. It is like fishing in a well-stocked lake—there are many types of responses admissible. One example of the thought question would be, "What is your opinion about America giving added financial aid to other countries? What reasons do you have?"

3. *Open-end Sentences :* This technique is used primarily in the field of guidance. For instance, the counselor may give the beginning of a sentence such as "Friends are ----------."

The child, either in writing or orally will complete the sentence, thus revealing certain feelings that may give a clue to his personal problems.

This technique might be capitalized by classroom teachers in stimulating children to give their opinions on topics related to their courses. For instance, a teacher might use such an open-end sentence as "The Civil War was caused by ....." or "I could improve my work by ....." which, in turn, would trigger a variety of information and opinions.

4. *Oral Quiz:* The oral quiz, properly handled, can be a most dynamic evaluation instrument. Through use of the penetrating question, pupils can reveal their insight into a problem and thus share their best thinking with other class members. The important thing is for the teacher to avoid the use of questions which depend only on "Yes" or "No;" or on a simple one-word answer. Pupils should be taught to give leadership in the oral quiz, for often *a well-formulated question is a better judgment of the pupil's understanding than a correctly-given answer.*

5. *Others:* Pupil attitude, pupil production, pupil work standards, library check-outs, quality of oral reports, essay-type tests, self-appraisal, group appraisal, sociometric techniques, evidences of originality and inventiveness, contributions to class discussions, general all-around value to the class and the school.

In Conclusion

The above listing of a variety of teaching techniques obviously has its limitations. In the first place, such a listing might be interpreted as a recommendation that teachers and pupils engage in a hodge-podge of activities, reaching frequently into a smorgasbord of techniques. It is also apparent that other writers might prefer a different classification pattern. Some might feel that there should be fewer but broader categories. It is also likely that the interpretation given to some of these techniques may not have application in certain teaching situations.

The important thing, however, is that some such listing may help a teacher or a school to better judge if they are providing pupils with a reasonable range of experiences and an adequate balance in activities. The teacher who is familiar with many possibilities is the one most likely to use the method most appropriate for achieving the goal sought. And young people, given a reasonable variation in classroom routine, are likely to respond with purpose and achievement. When they do, school is a place where these young people want to be.

Variety is the mother of enjoyment

—Disraeli

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VIEWPOINTS

Critics and Criticisms

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It's true that we need the goad of criticism to keep us vigorous. Toynbee illustrated that in his story of the North Sea fishermen. Too much of the catch decayed before the ships got home, so they installed tanks. That didn't solve the problem, because while none of the catch decayed, life was so easy for the fish that they became flabby, oily, and unpalatable. Then the fishermen put in a few voracious cannibal fish, and that paid off. True, some of the fish were unlucky and eaten by the cannibals, but the rest were lucky, they became vigorous, healthy, and so palatable that they were devoured by humans.

We school folks are being snapped at now by a lot of cannibals, and we certainly are stepping faster. I imagine that the result so far is good. It is possible to have enough of even good things, though, and I'm beginning to feel that we have just about had enough. It's possible to put so many cannibals in the tank that when the ship comes home about all that is left is cannibals and a few bony, neurotic scarecrows of food fish. It's possible, too, to criticize the schools and school people so sharply that good education can be destroyed and all who are left to teach are neurotic nit-wits, scared of their own shadows.

Of course, I'm anxious to make our schools better. I think we all are. I believe that it's natural for educators to strive to make education better. Really, that's about two-thirds of our job, anyhow—research, new knowledge, and improved practice. On the other hand, I don't apologize one bit for what we have done. The schools can be better, and they will be. But certainly they are a lot better than they have been. I don't feel called upon to stand hat-in-hand before abusive critics like Uriah Heep and admit to being a poor, miserable sinner of a school man.

I'm getting a little tired of people who go around self-consciously saying "We must welcome criticism" and drinking it up as if the unpleasant draft was a dry martini. I think it's time to accentuate the positive, point out a lot of the good things the schools are doing, and give the people some grounds to hope that because, like the Biblical parable, we have made the most of a few talents we may be trusted with more talents. Whoever heard of a failure successfully going to his boss and getting a raise and more responsibility because so far he had done such a lousy job?

A lot of our critics are just plain sadistically and brutally unfair, and they can do much damage to American education. They can shove it into directions which will defeat its purpose, which is

to tailor-make it so that each child is given the kind and the amount that he needs and can use. Some of our critics remind me of the old retired deacon who enjoyed church fights. A grand scrap brewed, and he hadn't declared himself. The Board of Administration got nervous and sent a committee to find out where he stood. He told them, "I have not yet made up my mind, but I can assure you that when I do I shall be very bitter about it."

THE EDUCATIONAL FRONTIER

Vagaries of the "Educated" Mind

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THE technique of sampling is fraught with hazards under any circumstances, the most worrisome being that the samples may be too few to represent faithfully the great mass of subjects to be studied. Researchers guard against this danger, and capable readers of research are pretty sure to estimate first of all the adequacy of the sample upon which the conclusions of such studies are based.

What then shall we think of an article that deliberately selects nothing but what the writer considers "enormities" to prove the monstrous degeneracy of American schools? Yet this is exactly the technique of Clifton Fadiman in his column, "Party of One," in *Holiday* for August, 1958. The irony of his fallacy is unconsciously heightened by a picture of the distinguished critic standing in a collegiate cap and gown and pointing to a THINK sign strategically placed above some impressive shelves of books. When a so-called "trained mind" falls into such a short circuit, one can only hope that like examples are not too prevalent among the "educated."

Now if the author will take the trouble to examine any one or all of the schools whence his "*catalogue déraisonné*" is drawn, he will be practically sure to find a strong, respectable core of academic subjects dominating the curriculum of each and every school; he will find the great majority of capable students preoccupied with "fundamental" learning in such fields as English (literature, reading, writing, spelling, and theme correction), science, history and other social studies, mathematics, and foreign language. Preoccupation with these subjects will consume about 75% of the pupils' time. In fact, he will find that the election cards of most students in these schools will contain at least three of these "required" courses for every one of Mr. Fadiman's list of horrors (co-educational homemaking, work experience courses, physi-

cal education, art in everyday life, etc.). If he discovers some exceptions— and he may—they will quite likely represent those pupils who receive what Mr. Fadiman calls contemptuously "the wet-nursing of the retarded" or those for whom the Life Adjustment Program was originally designed, the few for whom the academic studies proved, after long experimental efforts, to be profitless or tragically frustrating.

Critics like Mr. Fadiman might very well examine a couple of studies reported in the *Phi Delta Kappan* for June, 1958, entitled "Do Intellecually Superior Students Take *Soft* Courses?" These studies conducted in Indiana and in Wisconsin show that superior students not only take difficult courses like Latin, algebra, geometry, advanced mathematics, biology, chemistry, and physics; but that they take more of these subjects than are actually required for graduation. "The typical student in this study completed an additional semester of work in each of four subjects above the minimum requirements. Moreover, while eleven students took only the bare minimum of sixteen units, over three times that number—almost 20 per cent—successfully completed the equivalent of an additional year of work over and above the basic requirements."

It is a curious phenomenon—this headlong intrusion into professional education by educated laymen, with their violent, explosive effusions over matters very imperfectly understood. It seems to this writer that the only cure for such absurdities is a better inculcation of the basic principles of scientific inquiry; the seeking of sure evidence before the utterance of judgments, the establishing of clear perspectives on the relative significance of the evidence, and the maintaining of the utmost caution against distortions thereof or radical claims therefor. But such inculcation would represent an immense achievement in the history of civilization, one that we have only begun to perceive dimly outlined on the far horizon. When the great masses of mankind have achieved this much of intellectual know-how—the careful control of their own rationalizations—the future of the species will seem more confidently assured.

In the meantime, the windmills of folly are steadily turning, and Don Quixote has mounted his horse.

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